Regional Association V - Tropical Cyclone Operational Plan for the South Pacific and South-East Indian Ocean

Tropical Cyclone Programme

Report No. TCP-24

2024 edition

WEATHER CLIMATE WATER

World Meteorological Organization

WMO-No. 1181

WMO-No. 1181

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ISBN 978-92-63-11181-4

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This publication has been issued without formal editing.

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CHAPTER 1: GENERAL

1.1. Objective

The objective of this Plan is to provide for effective co-ordination and cooperative efforts amongst Members[1] in the South Pacific and South-East Indian Ocean in order to improve the warning systems for the protection of lives and the reduction of human suffering and property damage caused by tropical cyclones and associated storm surges, floods and landslides.

1.2. Status of the document

The Plan has been formulated by the RA V Tropical Cyclone Committee (RA V TCC) for the South Pacific and South-East Indian Ocean at the request of the WMO Regional Association V (South-West Pacific) (RA V), within the framework of the Tropical Cyclone Programme of WMO.

The Plan is reviewed regularly by the TCC (at least every 2 years at TCC meetings) and endorsed by various meetings of Regional Association V and the WMO Congress through its endorsement of the Tropical Cyclone Programme within the overall WMO Strategic Plan.

1.3. Scope

The Plan describes the existing internationally coordinated systems and arrangements agreed upon by the RA V TCC with a view to making the best use of the existing resources and facilities towards providing the most effective tropical cyclone warning system for the Region. It describes the warning systems and defines the international tropical cyclone forecasting and warning responsibilities of all Members concerned. It also sets out agreed arrangements for:

a. units and terminology
b. exchange of information and advisories
c. operational procedures

The Plan also describes existing arrangements in the Region for:

a. the provision of observational data
b. telecommunications for the exchange of data and processed information on tropical cyclones

It describes national practices and procedures which are of international and regional significance.

1.4. Arrangements for updating

The Operational Plan is implicitly evolutionary in nature. It will be updated from time to time to accommodate changed circumstances.

The RA V TCC shall review the Plan at each of its sessions and amendments are subject to the approval of the president of RA V. There are some attachments which are subject to review by other bodies within or in conjunction with WMO and these are co-ordinated through the Tropical Cyclone Programme.

[1] In this Plan the term Members refers to those Members of Regional Association V invited by Resolution 7 (XV-RA V) to nominate members of the RA V Tropical Cyclone Committee for the South Pacific and South-East Indian Ocean and to those countries and territories in the Region invited by the Resolution to participate in the work of the Committee.

1.5. Operational terminology used in the South Pacific

1.5.1. Equivalent terms

1.5.1.1. Weather disturbance classification

Tropical cyclones can be classified in different ways across the South Pacific and Southeast Indian Ocean. The table below summarises some of the terminology used across the region:

Classification of weather disturbances (USA as used in American Samoa)	Classification of weather disturbances (Australia and South Pacific)	Classification des perturbations météorologiques (French)	10-minute mean wind (knots)*
Tropical depression	Tropical low/depression	Dépression tropicale faible	<34
Tropical storm	Tropical cyclone (gale)	Dépression tropicale modérée	34-47
Tropical storm	Tropical cyclone (storm)	Dépression tropicale forte	48-63
Hurricane	Tropical cyclone (hurricane) Severe tropical cyclone	Cyclone tropical Cyclone tropical (très) intense[2]	>=64

* American Samoa uses 1-minute mean winds; generally greater than 10-minute mean winds (see Attachment 1A)

1.5.1.2. Cyclone related terms

Cyclone characteristics (English)	Caractéristiques d'un cyclone (French)
Eye	Oeil
Centre	Centre
Centre fix	Position du centre
Confidence in centre position	Confiance sur la position du centre
Direction of movement	Direction du déplacement
Average wind speed	Vitesse du vent moyen/vitesse moyenne du vent
Maximum wind speed	Vitesse maximale du vent
Gust	Rafales
Storm surge	Onde de tempête
Storm tide	Marée de tempête

1.5.1.3. Warning system related terms

English	French
Tropical Cyclone Season	Saison cyclonique
Tropical Cyclone Advisory [3]	Bulletin météorologique pour un phénomène tropical (depression ou cyclone)
Tropical Cyclone Alert [4]	
Tropical Disturbance Advisory [5]	
Tropical Disturbance Summary [5]	
Tropical Cyclone Watch [5]	
Tropical Cyclone Warning [6]	
Special Advisory [6]	
Special Weather Bulletin [4]	
Hurricane Local Statement [7]	

[2] for tropical cyclone category 4 (and 5) in French Polynesia, New Caledonia, Wallis and Futuna
[3] Used in Tonga
[4] Used in Fiji
[5] Used in Australia, Papua New Guinea and American Samoa
[6] Used in Australia, Fiji and American Samoa
[7] Used in American Samoa

1.5.1.4. Warnings related terms

English	French
Warnings	Avis
Gale wind warning	Avis de coup de vent
Storm-force wind warning	Avis de tempête
Hurricane-force wind warning	Avis de cyclone tropical

1.5.2 *Meanings of terms used for regional exchange*

Advice: See Tropical cyclone advice.

Alert: See Tropical cyclone alert.

Average wind speed: Speed of the wind averaged over the previous 1 or 10 minutes.

Central pressure: Pressure at the centre of the tropical cyclone as measured or estimated.

Centre of the tropical cyclone: The estimated position of the surface centre.

Confidence in the centre position: Degree of confidence in the centre position of a tropical cyclone expressed as the radius of the smallest circle within which the centre may be located by the analysts. "Position good" implies a radius of less than 30 nautical miles (55 kilometres), "Position fair", a radius of 30 to 60 nautical miles (55 to 110 km) and "Position poor", a radius of greater than 60 nautical miles (110 km).

Convergence zone: where air streams of different directions or speeds merge.

Cyclone: See Tropical cyclone. This terminology may be used by Australia and New Zealand in order to support their public messaging for any tropical cyclones that transition into a sub-tropical or extra-tropical cyclone with at least gale force winds (sustained winds of 34 knots or greater) around the centre.

Cyclone Category: The Australian tropical cyclone category scale is largely used across the South Pacific and South-East Indian Ocean, except in American Samoa where the Saffir-Simpson category scale is used. The tropical cyclone category will be included in all bulletins, where appropriate. For further details about the Australian and Saffir-Simpson tropical cyclone category scales refer to: http://www.bom.gov.au/cyclone/tropical-cyclone-knowledge-centre/understanding/categories/ and https://www.weather.gov/ppg/cyclone respectively.

Tropical cyclone season: The typical period of the year when tropical cyclones occur. In the South Pacific and South-East Indian Ocean, it is the period from 1 November to 30 April. (Note: cyclones occasionally occur outside of this period).

Tropical cyclone year: 1 July to 30 June (in UTC time).

Depression: A synoptic low-pressure area with extra-tropical characteristics where the average wind speed may exceed 33 knots (63 km/h or 38 mi/h) or Beaufort Force 7.

Direction of movement of the tropical cyclone: The direction towards which the centre of the tropical cyclone is moving.

Eye of the tropical cyclone: The relatively clear and calm area inside the circular, convective wall clouds.

Gale force wind: Average surface wind speed of 34 to 47 knots (63 to 87 km/h, 39 to 54 mi/h or wind force of 8 or 9 in the Beaufort scale).

Gale warning: Meteorological message intended to warn those concerned of the occurrence (or expected occurrence) and potential impact (for land areas) of gale force winds.

Gust: Sudden, brief increase of the wind speed over its average value.

Hurricane or severe tropical cyclone: A tropical cyclone with hurricane force winds. The term hurricane is used in American Samoa for public warnings[8]

Hurricane-force wind: Average surface wind of 64 knots (118 km/h, 74 mi/h or Beaufort Force 12) or more.

Hurricane-force wind warning: Meteorological message intended to warn those concerned of the occurrence (or expected occurrence) and potential impact (for land areas) of hurricane force winds.

Hurricane Local Statement: A discussion preparedness product, with an overview of the storm, which conveys a succinct message on local impacts from a tropical cyclone.

Intertropical Convergence Zone (ITCZ): A relatively narrow zone where the trade winds from both the Northern Hemisphere and the Southern Hemisphere merge.

Landfall: the intersection of the estimated surface centre of a tropical cyclone with a coastline.

Mean wind speed: See Average wind speed.

Monsoon depression: A tropical depression (or tropical low) embedded in the monsoon trough.

Monsoon low: See monsoon depression.

Monsoon trough: A shear zone with westerly monsoon winds on the equatorial side and easterly trade winds on the poleward side.

Naming a Tropical Cyclone: Once the criteria of a Tropical Cyclone are met (see definition of a Tropical Cyclone below), the system will be given an identification name. The name given to the tropical cyclone will be dictated by the Area of Responsibility in which the system is located (Figure 1) and derived from the name list held by the TCWC or RSMC with primary responsibility for that area (see section 2.2.1.2). Further guidance on the naming of a tropical cyclone can be found in section 2.2.1.1. A tropical cyclone will be named whenever observations and/or Dvorak intensity analysis indicate the presence of gale force or stronger winds near the centre, which are likely to continue.

Numbering a Tropical Disturbance/Depression: Tropical Lows that have the potential to develop into a tropical cyclone maybe given identification numbers to assist with operational software or to easily differentiate between weather systems. Each RSMC/TCWC has responsibility for allocating these identifiers. Identifiers contain a two-digit number, assigned sequentially to systems from 01 during the tropical cyclone year (1 July to 30 June), and one or more letters to signify the source of the identifier. The formats used within the South Pacific and South-East Indian Ocean are:

- nnF assigned by RSMC Nadi
- nnU assigned by TCWC Melbourne

where nn is the two-digit number.

RSMC: Regional Specialised Meteorological Centre.*South Pacific Convergence Zone (SPCZ):* A semi-permanent convergence zone found in the tropical South Pacific marked by the boundary between the usually cooler and stronger southeast trade wind flow and warmer and lighter east or northeast winds, or north-westerly winds when the SPCZ is active.

Special Advisory: A message to a National Meteorological Centre giving information on a tropical disturbance or a tropical cyclone.

Special Weather Bulletin: Bulletins issued to place threatened communities on alert, to give progress reports on developments or to give specific warnings of tropical cyclones or other disturbances and their potential impacts.

Speed of movement of the cyclone: Speed of past movement of the centre of the tropical cyclone in the last 6 or 12h.

Storm-force wind: Average surface wind of 48 to 63 knots (88 to 117 km/h, 55 to 72 mi/h or Beaufort Force 10 or 11).

Storm surge: The difference between the actual sea level under the influence of a weather disturbance (storm tide) and the normal astronomical tide.

Storm tide: The actual sea level as influenced by a weather disturbance. The storm tide consists of the normal astronomical tide, storm surge and wave setup.

Storm-force wind warning: Meteorological message intended to warn those concerned of the occurrence (or expected occurrence) and potential impact (for land areas) of storm force winds.

Sustained wind speed: See Average wind speed.

TCWC: Tropical Cyclone Warning Centre.

Tropical cyclone: A warm-core, non-frontal synoptic scale low pressure system, originating over tropical or subtropical waters with gale force winds (sustained winds of 34 knots or greater) that are likely to continue near the centre. Note: In the Australian region, the gale force winds must extend more than half-way around the centre and persist for at least six hours.

Tropical cyclone advice: A tropical cyclone watch and/or a tropical cyclone warning.

Tropical cyclone alert: A special weather bulletin providing information on the progress of a cyclone still some distance away and with a significant probability of causing gales or stronger winds in a community in the next 24 to 48 hours.

Tropical cyclone warning: A warning of gales or stronger winds and their potential impact associated with a tropical cyclone expected to occur within 24 hours.

Tropical cyclone watch: A forecast message of gales or stronger winds and their potential impact associated with a tropical cyclone occurring after 24 hours and before 48 hours.

Tropical depression = tropical low: A tropical disturbance with a clearly defined cyclonic wind circulation in which the central position can be estimated, and the maximum 10-minute average wind speed is less than 34 knots* (63 km per hour i.e. gale force) near the centre. There may be gale force or stronger winds in one or more quadrants but not near the centre.

Tropical disturbance: A non-frontal system of synoptic scale originating over the tropics with persistent enhanced convection and/or some indications of cyclonic wind circulation.

Tropical Disturbance Advisory/Bulletin/Summary: A message for exchanging information, internationally, on a range of disturbances including tropical depressions and tropical cyclones.

Tropical low = tropical depression.

Tropical storm: A tropical cyclone with gale or storm force winds. This term is used in American Samoa.

Trough or trough of low pressure: An elongated zone of low pressure; the axis of a trough is known as the trough line.

Watch: See Tropical Cyclone Watch.

Wave setup: Localised increase in the still-water sea level produced by breaking waves close to the shore.

Weather Bulletin: A bulletin issued at regular times to give weather information and forecasts to the general public or marine interests.

[8] Used in the Federated States of Micronesia and American Samoa

1.6. Units and indicators used for regional exchange

1.6.1 Marine

The following units/indicators are used for marine purposes, in accordance with the WMO Manual on Marine Meteorological Services (WMO No.558):

(a) Distance in nautical miles, the unit (nm) being stated;

(b) Location (position) by degrees and where possible tenths of degrees of latitude and longitude, preferably expressed in numbers;

e.g. "12.2S, 168.4E"

(c) Direction of motion to the nearest sixteen points of the compass or in degrees to the nearest ten, given in figures;

e.g. "SOUTHSOUTHEAST" or "160 DEGREES"

(d) Speed (wind speed and direction of movement of tropical cyclones) in knots, the unit (kt) being stated;

(e) Pressure in hectopascals (hPa), the unit being stated;

(f) Confidence in the centre position expressed in nautical miles (nm) or as "GOOD", "FAIR" or "POOR" as described in 1.5.2 (optional)

(g) Time in Universal Time Co-ordinated (UTC), the unit being stated.

1.6.2 Non-marine

The following units/indicators are used in non-coded segments of exchanges, other than marine bulletins:

(a) Distance in nautical miles (nm) or kilometres (km), the units being stated;

(b) Direction in sixteen points of compass given in words e.g. SOUTHEAST;

(c) Location (position) in latitude and longitude by degrees and tenths of degrees (in figures) and/or bearing on the sixteen-point compass and distances from well-known places;

(d) Speed (wind speed and speed of movement of system) in knots (kt) or kilometres per hour (km per hour) the unit being stated;

(e) Confidence in the centre position in kilometres (km) or nautical miles (nm);

(f) Time in UTC or local time, the unit being stated.

ATTACHMENT 1A: Guidelines for converting between various wind averaging periods in tropical cyclone conditions

This note is based on recommendations from Harper et al. (2010) and extracts from Knaff and Harper (2010), providing advice on why, when and how "wind averaging conversions" can be made.

a) Why Convert Wind Speeds?

From the observational perspective, the aim is to process measurements of the wind so as to extract an estimate of the **mean** wind at any time and its **turbulence** properties. From the forecasting viewpoint, the aim is, given a specific wind speed metric derived from a process or product, to usefully predict other metrics of the wind. Typically, these needs revolve around the concept of the mean wind speed and an associated peak gust wind speed; such that the statistical properties of the expected level of wind turbulence under **different exposures** can be used to permit useful conversions **between peak gust wind speed** estimates.

b) When to Convert Wind Speeds?

Wind speed conversions to account for varying averaging periods only apply in the context of a maximum (peak gust) wind speed of a given duration observed within some longer interval. Simply measuring the wind for a shorter period of time at random will not ensure that it is always higher than the mean wind (given that there are both lulls and gusts). It is important that all wind speed values be correctly identified as an estimate of the **mean wind** or an estimate of a **peak gust**.

Once the mean wind is reliably estimated, the random effects of turbulence in producing higher but shorter-acting wind gusts, typically of greater significance for causing damage, can be estimated using a "gust factor". In order for a gust factor to be representative, certain conditions must be met, many of which may not be exactly satisfied during a specific weather event or at a specific location:

- Wind flow is turbulent with a steady mean wind speed (**statistically stationary**);
- Constant surface features exist within the period of measurement, such that the boundary layer is in equilibrium with the underlying surface roughness (**exposure**);
- The conversion assumes the mean wind speed and the peak gust wind speed are at the same **height** (e.g. the WMO standard observation height +10 m) above the surface.

c) How to Convert Individual Point-Specific Wind Speeds

Firstly, the mean wind speed estimate V should be explicitly identified by its averaging period T_o in seconds, described here as V_{To} , e.g.

V_{600} is a 10-min averaged mean wind estimate;
V_{60} is a 1-min averaged mean wind estimate; V_3 is a 3-sec averaged mean wind estimate.

Next, a peak gust wind speed should be additionally prefixed by the gust averaging period τ, and the time period over which it is observed (also termed the **reference period**), described here as $V_{\tau,To}$, e.g.

$V_{60,600}$ is the highest 1-min mean (peak 1-min gust) within a 10-min observation period;
$V_{3,60}$ is the highest 3-sec mean (peak 3-sec gust) within a 1-min observation period.

The "gust factor" $G_{\tau,To}$ then relates as follows to the mean and the peak gust:

$$V_{\tau,To} = G_{\tau,To} V ,$$

Where the (true) mean wind V is estimated on the basis of a suitable sample, e.g. $V600$ or $V3600$.

On this basis, Table 1 provides the recommended near-surface (+10 m) conversion factors $G_{\tau,To}$ between typical peak gust wind averaging periods, which are a strong function of the exposure class because the turbulence level varies depending on the surface roughness. Table 1 only provides a range of indicative exposures for typical forecasting environments and Harper et al. (2010) or WMO (2008) should be consulted for more specific advice regarding particular types

of exposures - especially if it is intended to calibrate specific measurement sites to "standard exposure".

Table 1 Wind speed conversion factors for tropical cyclone conditions (after Harper et al. 2010).

Exposure at +10 m		Reference	Gust Factor $G_{\tau,To}$				
Class	Description	Period *To* (s)	*Gust Duration* τ (s)				
			3	*60*	*120*	*180*	*600*
In-Land	Roughly open terrain	3600	1.75	1.28	1.19	1.15	1.08
		600	1.66	1.21	1.12	1.09	1.00
		180	1.58	1.15	1.07	1.00	
		120	1.55	1.13	1.00		
		60	1.49	1.00			
Off-Land	Offshore winds at a coastline	3600	1.60	1.22	1.15	1.12	1.06
		600	1.52	1.16	1.09	1.06	1.00
		180	1.44	1.10	1.04	1.00	
		120	1.42	1.08	1.00		
		60	1.36	1.00			
Off-Sea	Onshore winds at a coastline	3600	1.45	1.17	1.11	1.09	1.05
		600	1.38	1.11	1.05	1.03	1.00
		180	1.31	1.05	1.00	1.00	
		120	1.28	1.03	1.00		
		60	1.23	1.00			
At-Sea	> 20 km offshore	3600	1.30	1.11	1.07	1.06	1.03
		600	1.23	1.05	1.02	1.00	1.00
		180	1.17	1.00	1.00	1.00	
		120	1.15	1.00	1.00		
		60	1.11	1.00			

Some example applications of the above recommendations are:

- To estimate the expected "off-land" 3-sec peak gust in a 1-min period, multiply the estimated "off-land" mean wind speed by 1.36
- To estimate the expected "off-sea" 3-sec peak gust in a 10-min period, multiply the estimated "off-sea" mean wind speed by 1.38
- To estimate an "at-sea" 1-min peak gust in a 10-min period, multiply the estimated "at-sea" mean wind speed by 1.05

Note that it is not possible to convert from a peak gust wind speed back to a **specific** time-averaged mean wind – only to the **estimated true mean** speed. Hence to estimate the "off-sea" mean wind speed given only a peak observed gust of 1-min duration (τ = 60 s) measured in a 10-min period (*To* = 600 s), multiply the observed 1-min peak gust by (1/1.11) = 0.90. This does not guarantee that the estimated mean wind will be the same as the 10-min averaged wind at that time but, because the 10-min average is normally a reliable estimate of the true mean wind, it will likely be similar. In all cases, measurement systems should aim to reliably measure the mean wind speed and the standard deviation using a sample duration of not less than 10-min (WMO 2008), i.e. *V600*. Additional shorter averaging periods and the retaining of peak information should then be targeted at operational needs.

d) Converting Between Agency Estimates of Storm Maximum Wind Speed Vmax

This is a slightly different situation from converting a point specific wind estimate because the concept of a storm-wide maximum wind speed *Vmax* is a metric with an associated spatial context (i.e. anywhere within or associated with the storm) as well as a temporal fix context (at this moment in time or during a specific period of time). While it may be expressed in terms of any wind averaging period it remains important that it be unambiguous in terms of representing a mean wind or a peak gust. Agencies that apply the WMO standard 10-min averaged *Vmax* wind have always applied a wind-averaging conversion to reduce the maximum "sustained" 1-min wind value (a 1-min peak gust) that has been traditionally associated with the Dvorak

method (Dvorak 1984, Atkinson and Holliday 1977)[9]. As noted in the previous section, it is technically not possible to convert from a peak gust back to a specific time-averaged mean wind – only to the estimated true mean wind speed. However, in Harper et al. (2010) a practical argument is made for nominal conversion between *Vmax60* and *Vmax600* values via an hourly mean wind speed reference, and the recommendations are summarised in Table 2.

It can be noted that the recommended conversion for at-sea exposure is about 5% higher than the "traditional" value of 0.88 (WMO 1993), which is more appropriate to an off-land exposure. This has special implications for the Dvorak method because "at sea" is the typical exposure of interest where such conversions have been traditionally applied.

Table 2 Conversion factors between agency estimates of maximum 1-min and maximum 10-min averaged tropical cyclone wind speed *Vmax*. (After Harper et al. 2010).

Vmax600=K Vmax60	At-Sea	Off-Sea	Off-land	In-Land
K	0.93	0.90	0.87	0.84

e) References

Atkinson, G.D., and C. R. Holliday, 1977: Tropical cyclone minimum sea level pressure/maximum sustained wind relationship for the Western North Pacific. *Mon. Wea. Rev.,* **105**, 421-427.

Dvorak, V.F., 1984: Tropical cyclone intensity analysis using satellite data. NOAA Tech. Rep. NESDIS 11, *National Oceanic and Atmospheric Administration*, Washington, DC, 47 pp.

Knaff, J.A. and B.A. Harper, 2010: Tropical cyclone surface wind structure and wind-pressure relationships. In: Proc. WMO IWTC-VII, *World Meteorological Organization*, Keynote 1, La Reunion, Nov.

Harper, B.A.,, J. D. Kepert, and J. D. Ginger, 2010: Guidelines for converting between various wind averaging periods in tropical cyclone conditions. *World Meteorological Organization*, TCP Sub-Project Report, WMO/TD-No. 1555.

WMO 1993: Global guide to tropical cyclone forecasting. Tropical Cyclone Programme Report No. TCP-31, *World Meteorological Organization*, WMO/TD – No. 560, Geneva.

WMO 2008: Guide to meteorological instruments and methods of observation. *World Meteorological Organization*, WMO-No. 8, 7th Ed, 681pp.

[9] As detailed in Harper et al. (2010), this traditional assumption is without a firm basis.

CHAPTER 2: RESPONSIBILITIES OF MEMBERS

2.1 Area of responsibility

2.1.1 Forecasts and warnings for the general population

In the southern hemisphere portion of RA V, the responsibilities for preparing and issuing warnings on tropical cyclones and related hazardous weather phenomena for the general population are as follows:

Australia	The coastal waters and land areas of Australia including Christmas Island, Cocos Island, Lord Howe Island and Norfolk Island.
Fiji	The coastal waters and land areas of Cook Islands, Fiji, Kiribati, Banaba, Nauru, Niue, Tokelau and Tuvalu.
French Polynesia	The coastal waters and land areas of French Polynesia.
Indonesia	The coastal waters and land areas of Indonesia.
New Caledonia	The coastal waters and land areas of New Caledonia, Wallis and Futuna.
New Zealand	The coastal waters and land areas of New Zealand.
Papua New Guinea	The coastal waters and land areas of Papua New Guinea.
Samoa	The coastal waters and land areas of the Independent State of Samoa.
Solomon Islands	The coastal waters and land areas of Solomon Islands.
Tonga	The coastal waters and land areas of the Kingdom of Tonga
Timor Leste	The coastal waters and land areas of Timor Leste.
USA (American Samoa)	The coastal waters and land areas of American Samoa.
Vanuatu	The coastal waters and land areas of Vanuatu.

2.1.2 Forecasts and warnings for the open sea

The IMO/WMO Worldwide Met-Ocean Information and Warning Service (WWMIWS) is the internationally coordinated service for the promulgation of meteorological warnings and forecasts.

The WWMIWS guidance and coordination for marine meteorological maritime safety information messages issued on EGC (SafetyNET), NAVTEX and HF NBDP communication systems covering the following areas:

- warnings and forecasts for the High Seas;
- Warnings and forecasts for coastal, offshore and local waters (including ports, lakes and harbour areas).

Operational guidance for handling and formatting meteorological information is given in detail in the Annex IV of the WMO Technical Regulations (Manual on Marine Meteorological Services – WMO-No. 558).

The provision of warnings for weather systems that produce average wind speeds of 34 knots and greater are a mandatory requirement of the WWMIWS.

The responsibility for the preparation of marine tropical cyclone forecasts and warnings in the South Pacific and South-east Indian Ocean is shared amongst Members as follows:

Warning centre with prime responsibility	Boundary of area
TCWC Melbourne [10]	10S 90E, 10S 120E, 11S 120E, 11S 128E, 09S 128E, 09S 141E, 10S 141E, 9S 144E, 09S 144E, 12S 147E, 12S 155E, 08S 155E, 05S 160E, 40 S 160 E, 40 S 90 E, 10 S 90 E.
RSMC Nadi	25S 160E, 25S 120W, EQ 120W, EQ 160E, 25S 160E.
TCWC Port Moresby	EQ 141E, 10S 141E, 09S 144E, 12S 147E, 12S 155E, 08S 155E, 05S 160E, EQ 160E, EQ 141E.
TCWC Wellington	25S 160E, 25S 120W, 40S 120W, 40S 160E, 25S 160E.
TCWC Jakarta	EQ 090E, 10S 090E, 10S 120E, 11S 120E, 11S 128E, 09S 128E, 09S 141E, EQ 141E.

The areas of responsibility for warnings for the open seas are shown in the map in Figure 1.

One comprehensive marine warning per cyclone

Warning centres (as stated in the table above) without prime responsibility but affected by a tropical cyclone, are requested to consult with the primary RSMC/TCWC one hour or more before the next warning issue time to agree on warning areas for their area of responsibility.

2.1.3 SIGMET information and tropical cyclone advisories for aviation

In accordance with the International Civil Aviation Organization (ICAO) Annex 3 – *Meteorological Service for International Air Navigation*/ WMO Technical Regulations, Volume II, SIGMET[11] information for tropical cyclone, required for the international air navigation, are issued by designated meteorological watch offices (MWO).

MWO provides information for one or more specified flight information regions (FIRs) or upper information regions (UIRs) for which it is responsible for maintaining a continuous watch. The boundaries of the FIRs/UIRs are defined in ICAO Regional Air Navigation Plan (ANP) for the Asia and Pacific Regions.

The content and order of elements in a SIGMET message for tropical cyclone shall be in accordance with WMO Technical Regulations, Volume II. The data type designator to be included in the WMO abbreviated header of such TAC messages shall be T_1T_2 = WC (WMO-No. 386, Manual on GTS refers).

The Tropical Cyclone Advisory Centres (TCAC) Darwin and Nadi shall monitor the development of tropical cyclones in their areas of responsibility, as determined in the ICAO Regional ANP for the Asia and Pacific Regions and issue advisory information concerning the position of the cyclone centre, its direction and speed of movement, central pressure and maximum surface wind near the centre utilizing technical advice from relevant other TCWCs as appropriate.

A tropical cyclone advisory (TCA) will be issued for an active or developing tropical cyclone when the maximum 10-minute mean surface wind speed is expected to reach or exceed 34 knots during the period covered by the advisory (24 hours), and thereafter updated at least every six hours.

[10] In 2020, The Australian Bureau of Meteorology decided to merge the three Areas of Responsibilities of TCWC Brisbane, TCWC Darwin and TCWC Perth in a single Area of Responsibility named TCWC Melbourne.

[11] SIGMETs for tropical cyclones are only issued for those tropical cyclones having a 10-minute mean surface wind speed of 63 km/h (34 kt) or more (refer to "Tropical cyclone" on I-6 for criteria used in the Australian region).

The TCA shall be disseminated to the MWOs by TCAC Darwin and TCAC NADI in their respective areas of responsibility, to be used in the preparation of the outlook, to be appended to SIGMET messages for tropical cyclones. In addition, the tropical cyclone advisories shall be disseminated to the other TCACs, whose areas of responsibility may be affected, to the world area forecast centres (WAFC) London and Washington and international OPMET data banks, and centres operating the Internet-based services (SADIS FTP and WIFS).

The format of the tropical cyclone advisories shall be in accordance with the Technical Regulations, Volume II (WMO-No.49). The data type designator to be included in the WMO abbreviated header of such messages shall be T_1T_2 = FK (WMO-No. 386, Manual on GTS, refers).

2.2 Procedural responsibility

2.2.1 Responsibilities of tropical cyclone warning centres

Within the South Pacific and South-east Indian Ocean areas covered by this plan, there are five warning centres (Nadi, Jakarta, Melbourne, Port Moresby, and Wellington) which are responsible for the continuous monitoring of tropical cyclones.

The area of prime responsibility for each of these centres is indicated in 2.1.2 above and shown in Figure 1.

Each warning centre issues and ensures prompt dissemination of all tropical cyclone forecasts, warnings, advisories and bulletins to the general population and for international marine and aviation requirements according to the area responsibilities defined in Sections 2.1.1, 2.1.2 and 2.1.3. Details of the forecast information provided by the warning centres in the region are provided in Chapter 3.

In relation to international marine requirements, the WWMIWS coordinates the broadcast of forecasts and warnings to vessels at sea through the Global Maritime Distress and Safety System (GMDSS), which includes SafetyNET satellite communications.

As part of the WWMIWS coordination, there are the following types of Centres:

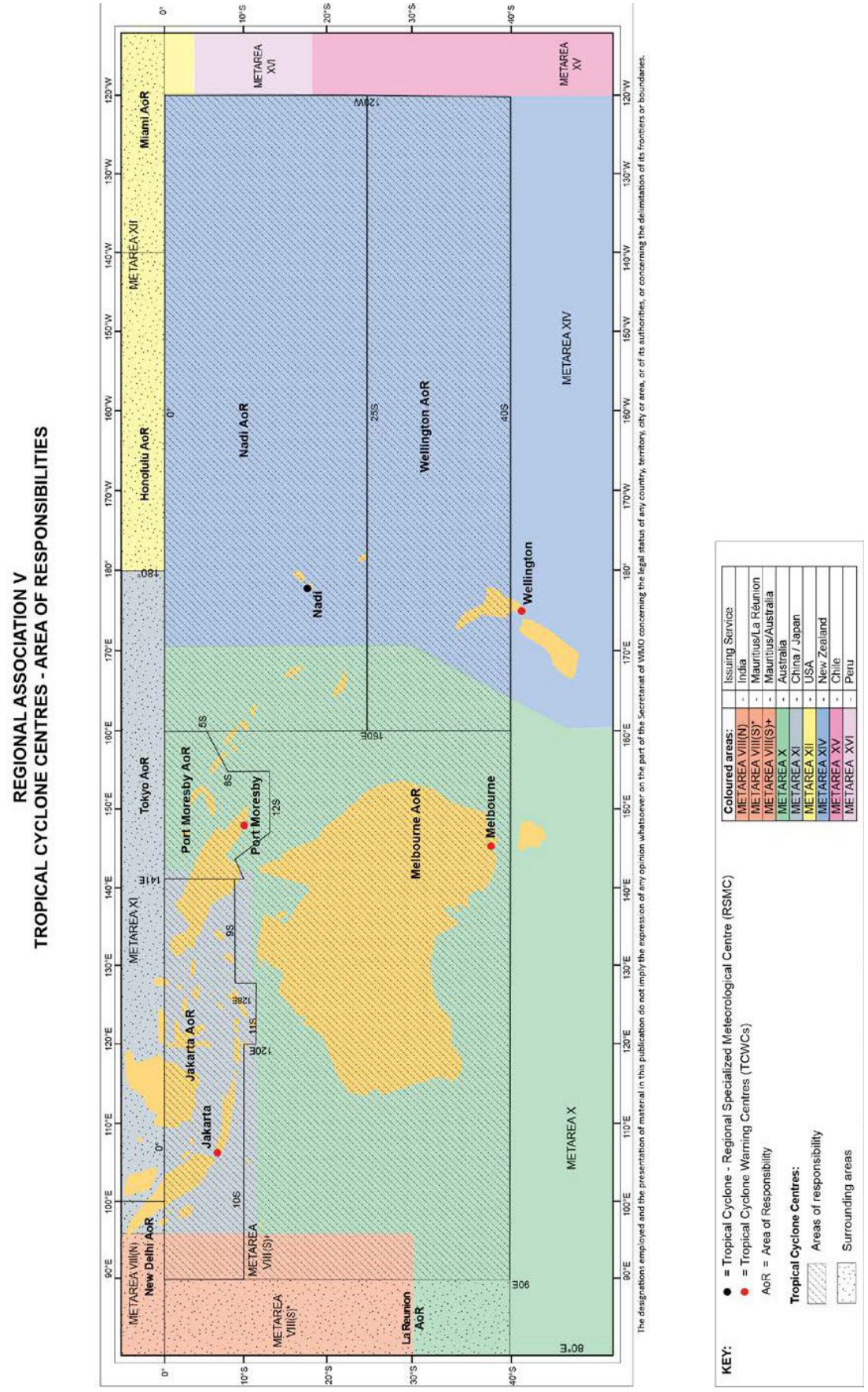
Issuing service means a National Meteorological Service which has accepted responsibility for ensuring that meteorological warnings and forecasts for shipping are disseminated through the Inmarsat SafetyNET service to the designated area (METAREA) for which the Service has accepted responsibility under the WWMIWS.

Preparation service means a National Meteorological Service which has accepted responsibility for the preparation of warnings and forecasts for parts of or an entire designated area (METAREA) in the WMO system for the dissemination of meteorological forecasts and warning to shipping under the WWMIWS and for their transfer to the relevant Issuing Service for broadcast.

Under the responsibilities section 3.2 for each centre, the above definitions have been applied to outline the coordination responsibilities in relation to issuing broadcasts on SafetyNET.

TCWCs maintain close liaison with each other and provide mutual support where necessary. Whenever a TCWC, RSMC and/or NHMS has observational data that is in conflict with the warning issued by another centre, that data is sent immediately to the warning centre which issued the warning.

Figure 1. Tropical cyclone warning centres' areas of prime oceanic responsibility south of the equator and relevant METAREA Areas of Responsibility



2.2.1.1 Naming tropical cyclones

For unambiguous identification of tropical cyclones, a system of naming has been adopted by the RA V Tropical Cyclone Committee.

Once the criteria of a Tropical Cyclone are met (see definition of a Tropical Cyclone in 1.5.2), the system will be given an identification name. The name given to the tropical cyclone will be dictated by the Area of Responsibility in which the system is located (Figure 1) and derived from the name list held by the TCWC or RSMC with primary responsibility for that area (see section 2.2.1.2). The naming convention may include systems that satisfy these criteria but have a non-classical appearance in the satellite imagery and/or originate outside the tropics.

Recognising the desire for a single authoritative voice and consistent messaging, other NMHS's, stakeholders and partner agencies in Disaster Risk Reduction shall exercise due care in quoting names until the RSMC or TCWC has named a system in accordance with approved WMO criteria.

If a tropical depression becomes a tropical cyclone in the TCWC Wellington area of responsibility, TCWC Wellington in consultation with RSMC NADI, will name the cyclone by using the next name from RSMC NADI's list.

The name selected follows that used for the most recent cyclone named by the warning centre. When the list is exhausted the sequence is repeated.

Once named, a tropical cyclone retains the same name for its entire lifetime which may include periods where the system weakens below tropical cyclone strength but then intensifies and/or when the system moves into an adjacent RSMC/TCWC Area of Responsibility. In special circumstances the name maybe changed when the system moves into a new AOR.

When tropical lows have a high probability of meeting naming criteria, the State likely to be affected may consult with RSMC NADI on possible early naming. This is to assist local authorities and their communities in taking appropriate and early action to reduce the impact of the system. Every effort should be made to reach consensus on the timing of cyclone classification and naming to meet the needs at the national level.

Recognising the responsibility of Members to issue tropical cyclone related products including warnings (as stated in section 2.2.2.1), national warning centres within the affected States are encouraged to issue early warnings prior to naming by the RSMC, in coordination with the national Disaster Management Authorities, that clearly indicate the potential for a tropical cyclone to develop within the warning period, ensuring consistency with information issued by RSMC Nadi.

Declassifying a Tropical Cyclone: A tropical cyclone should be declassified whenever observations and/or Dvorak intensity analysis indicate that the system has less than gale force winds near the centre or the system has transformed into an extra-tropical cyclone structure. Reference to the cyclone's name is usually dropped a short while after declassification.
Special circumstances may warrant a system being held as a named tropical cyclone, even if it has lost its tropical characteristics. The continuation of tropical cyclone warnings for such systems, and/or the reference to the name of the system, will be dependent on the circumstances surrounding each system.

Retiring a cyclone name: If the impact of a cyclone on a country or territory causes loss of life and/or significant damage and disruption to the way of life of a community, then the name assigned to that cyclone is retired from the list. However, in regard to Port Moresby, once a name is used, it is always retired from the list. Refer to Attachment 2A for a list of retired names. The Committee will replace a retired name with another name starting with the same letter.

2.2.1.2 Tables of tropical cyclone names

The name given to a tropical cyclone will be dictated by the Area of Responsibility in which the system is located (Figure 1) and derived from the name list held by the TCWC or RSMC with primary responsibility for that area (see following tables).

a) TCWC Melbourne Area of Responsibility

The name of a new tropical cyclone is selected from this list of names; normally chosen in sequence and cycling through each column of the list.

For guidance on the pronunciation of any of these names, refer to:
http://www.bom.gov.au/cyclone/tropical-cyclone-knowledge-centre/understanding/tc-names/

A	Anika	Anthony	Alessia	Alfred	Amber
B	Billy	Bianca	Bruce	Blanche	Blake
C	Charlotte	Courtney	Catherine	Caleb	Claudia
D	Darian	Dianne	Dylan	Dara	Declan
E	Ellie	Errol	Edna	Ernie	Esther
F	(TBA*)	Fina	Fletcher	Frances	Ferdinand
G	Gemm	Grant	Gillian	Greg	Gretel
H	Herman	Hayley	Hadi	Hilda	Heath
I	Isabella	Iggy	Ivana	Irving	Imogen
J	Julian	Jenna	Jack	Joyce	Joshua
K	Kima	Koji	Kate	Kelvin	Kimi
L	Lincoln	Luana	Laszlo	Linda	Lucas
M	Merryn	Mitchell	Mingzhu	Marco	Marian
N	Neville	Narelle	Nathan	Nora	Niran
O	Olga	Oran	Oriana	Owen	Odette
PQ	Paul	Peta	Quincey	Penny	Paddy
R	Robyn	Riordan	Raquel	Riley	Ruby
S	Sean	Sandra	Stan	Savannah	Stafford
T	Taliah	Tim	Tatiana	Trung	Tiffany
UV	Vince	Victoria	Uriah	Verity	Vernon
WXYZ	Zelia	Zane	Yvette	Wallace	

*TBA – to be advised.

b) RSMC Nadi Area of Responsibility

The name of a new cyclone is determined by sequentially cycling through lists A, B, C and D, then starting list A again. Names from the standby list E are used as replacements when necessary.

Guidance on the pronunciation of names have been provided in brackets.

	LIST A	LIST B	LIST C	LIST D	LIST E (standby)
A	Aru (ah-roo)	Arthur (ah-tha)	Alvin (el-vin)	Amos (ah-mos)	Adama (Ah-dah-mah)
B	Bina (bee-nah)	Becky (beh-key)	Bune (boo-neh)	Bart (bart)	Ben (ben)
C	Carol (kah-rol)	Chip (chip)	Cyril (sir-rill)	Crystal (kris-tal)	Christy (chris-tee)
D	Dovi (doh-vee)	Denia (de-nee-ah)	Danial (dah-nee-el)	Dean (deen)	Dakai (dah-kai)
E	Eva (ee-vah)	Elisa (ee-lee-sah)	Eden (ee-den)	Ella (el-lah)	Emosi (eh-mo-see)
F	Fili (fee-lee)	Fotu (foh-too)	Florin (flaw-rin)	Fehi (feh-hee)	Feki (feh-kee)
G	Gina (gee-nah)	Glen (glen)	Garry (gah-ree)	Garth (garth)	Germaine (jur-main)
H	Hale (hay-ill)	Hettie (heh-tee)	Haley (hay-lee)	Hola (ho-la)	Hart (hart)
I	Irene (eye-reen)	Innis (in-iss)	Isa (ee-sah)	Iris (eye-ris)	Ili (ee-lee)
J	Josese (joh-seh-seh)	Julie (ju-lee)	June (joon)	Jo (joh)	Junina (ju-nee-nah)
K	Kirio (kee-ree-o)	Ken (ken)	Kofi (cof-fee)	Kala (kah-lah)	Kosi (co-see)
L	Lute (loo-teh)	Lin (lin)	Louise (loo-ees)	Liua (lee-oo-ah)	Lia (lee-ah)
M	Mata (mah-tah)	Maciu (ma-thee-u)	Mike (mike)	Mona (moh-nah)	Manoah (mah-no-ah)
N	Nat (nat)	Nisha (nee-shaa)	Niko (nee-koh)	Neil (nee-ill)	Neta (neh-tah)
O	Osai (oh-sigh)	Orea (oh-reh-a)	Opeti (oh-peh-tee)	Oma (oh-mah)	Olina (oh-lee-nah)
P	Pita (pee-tah)	Palu (pah-loo)	Perry (peh-ree)	Pana (pah-nah)	Paea (pah-ee-ah)
R	Rae (ray)	Rene (reh-neh)	Reuben (roo-ben)	Rita (ree-tah)	Rex (rex)
S	Seru (seh-roo)	Sarah (sah-rah)	Solo (so-lo)	Samadiyo (sah-mah-dee-oh)	Sete (seh-teh)
T	Tam (tam)	Troy (troy)	Tuni (too-nee)	Tasi (tah-see)	Temo (teh-mo)
U	Urmil (er-mill)	Uinita (oo-ee-nee-tah)	Ulu (oo-loo)	Uesi (oo-eh-see)	Uila (oo-ee-lah)
V	Vaianu (vai-ah-noo)	Vanessa (vah-neh-sa)	Victor (vic-tor)	Vicky (vic-key)	Velma (vel-mah)
W	Wati (wah-tee)	Wano (wah-noh)	Wanita (wah-nee-tah)	Wasi (wah-see)	Wane (wah-neh)
X	Xavier (zay-vee-ah)				
Y	Yani (yah-nee)	Yvonne (ee-von)	Yates (yates)	Yabaki (yah-bah-key)	Yavala (yah-vah-lah)
Z	Zita (zee-tah)	Zaka (zah-kah)	Zidane (zee-dane)	Zazu (zah-zoo)	Zanna (zan-nah)

Note; the authority for naming tropical cyclones lies with the TCWC/RSMC as stated in section 2.2.1.

c) TCWC Port Moresby Area of Responsibility

The name of a new cyclone is determined by sequentially cycling through list A. Standby list B is used to replace retired names in List A and any replacement name will be added to the bottom of list A to maintain the alphabetical order.

LIST A	LIST B (STANDBY)
Alu	Nou
Buri	Obaha
Dodo	Paia
Emau	Ranu
Fere	Sabi
Hibu	Tau
Ila	Ume
Kama	Vali
Lobu	Wau
Maila	Auram

d) TCWC Jakarta Area of Responsibility

The name of a new tropical cyclone is determined by sequential cycling through List A. Standby List B is used to replace retired names in List A and any replacement will be added to the bottom of List A to maintain the alphabetical order.

LIST A	LIST B (Standby)
Anggrek	Anggur
Bakung	Belimbing
Cempaka	Duku
Dahlia	Jambu
Flamboyan	Lengkeng
Kenanga	Manggis
Lili	Nangka
Melati	Pepaya
Rambutan	Terong
Teratai	Sawo

2.2.1.3 Warnings near common boundaries

Whenever a tropical cyclone is within about ten degrees of a common boundary, the adjacent Warning Centre sharing that boundary receives all the Gale, Storm and Hurricane Warnings issued by the Warning Centre with prime responsibility for the area (see Section 2.1.2).

When a cyclone is located or is expected to be located such that two or more Warning Centres are involved, every attempt is made to resolve any differences of opinion on the cyclone and its expected behaviour but the decision of the Centre with prime responsibility will prevail.

The Warning Centre with prime responsibility for the cyclone issues the warning(s) for that cyclone including all regions affected by the tropical cyclone, even when these extend into another Centre's area of responsibility (refer to 2.1.2).

Any Centre that issues concurrent warnings or advisories for a tropical cyclone ensures that its products are consistent with those issued by the Centre with prime responsibility to ensure users do not receive conflicting information.

RSMC Nadi procedures

There is normally a period before and after the cyclone crosses a boundary when the cyclone will affect both areas. The following procedures are applied by RSMC Nadi:

RSMC Nadi/TCWC Wellington boundary: if a cyclone has crossed 25S into the Wellington area of responsibility but still affects the Nadi area of responsibility, the RSMC Nadi marine warning will simply state "Refer to warning [warning number] issued by Wellington on TC [name]"

RSMC Nadi/TCWC Melbourne boundary: if a cyclone in the TCWC Melbourne area is approaching the 160E boundary and likely to affect the RSMC Nadi area within the next 24 hours, or if a cyclone has crossed into the TCWC Melbourne area but is still affecting the RSMC Nadi area, then RSMC Nadi shall issue a full warning taking into account the latest information available from Australia. Usually, the TCWC Melbourne warning is available before the RSMC Nadi issue times so RSMC Nadi is able to reformat the Australian warning as specified in section 3.2.1.3. If there are any differences of opinion between the centres, whoever has primary responsibility for the issuing of warnings shall prevail.

2.2.1.4 Transfer of warning responsibilities

When a tropical cyclone is about to move from one AOR into another, discussions between the two Centres through phone or email needs to happen to determine the time and any other arrangements for that to occur efficiently.

Once the new Centre has accepted responsibility, the relinquishing Centre notifies all previous addressees of the transfer of responsibility and a reference is inserted in relevant products including international marine warnings.

If, before the next warning is due to be issued, the tropical cyclone does not move from one Centre's area of responsibility into another's as anticipated, the Centre which has accepted prime responsibility to issue warnings, issues the warning as agreed.

2.2.1.5 Contingency arrangements

When it is not possible for a Warning Centre to carry out all or some of its responsibilities, another designated Warning Centre temporarily assumes some or all these responsibilities in accordance with the current Contingency Plans as given in Chapter 5.

2.2.1.6 Non-operational responsibilities

Warning Centres serve as regional information centres for tropical cyclones in their area of prime responsibility (see Section 2.1.2), preparing reports on tropical cyclones as soon as possible after the event and maintaining forecast performance statistics (see Chapter 6).

2.2.2 Responsibilities of all Members

2.2.2.1 Internal dissemination of warnings

The production and/or dissemination of tropical cyclone related products including warnings, advisories, seasonal and medium range outlooks, media releases etc. in each country or territory is the responsibility of the country or territory concerned.

2.2.2.2 Provision of observational data

For an official repository of WMO Integrated Global Observing System (WIGOS) metadata for all surface-based observing stations and platforms in the RA V area, refer to the Observing Systems Capability Analysis and Review tool at https://oscar.wmo.int/surface/index.html#/

a) Surface observations

In addition to routine observations in the regular programme of the WWW Plan, during the cyclone season, Members provide additional surface observations from manually operated stations normally when a cyclone is within 200 km of a station or upon request by the responsible RSMC or TCWC.

b) Upper-air observations

During the cyclone season Members provide, as far as is possible, additional upper-air observations on request by the responsible RSMC/TCWC.

c) Reports from voluntary observing stations

Members make every effort to provide to the responsible RSMC/TCWC, observations made by voluntary observing stations as soon as possible, if necessary, as plain language reports using normal communication channels. Such reports include the coordinates of the observing station or other accurate measures of location.

d) Radar observations

Members make every effort to collect and distribute speedily and, as far as possible in a standard format, radar observations of tropical cyclones, particularly eye fixes at 00, 03, 06, 09, 12, 15, 18 and 21UTC.

2.2.2.3 Collection and exchange of other observational data

a) Ships weather reports

Members operating Coastal Radio Stations make prompt arrangements for specific requests for ship reports from any area of current cyclone activity and for the speedy collection and dissemination of such reports, even if some of these are to be transmitted in plain language.

b) Aircraft weather reports

Members collect and disseminate all aircraft observational reports received from within their respective areas of responsibility under the ICAO Air Navigation Plan.

2.2.2.4 Communications

Members disseminate forecasts, warnings and observations in accordance with Aeronautical Fixed Telecommunications Network (AFTN) or Aeronautical Message Handling System (AMHS) procedures and/or with Global Telecommunications System (GTS) procedures as appropriate (see Chapter 4).

2.2.2.5 Request-based high frequency regional satellite observation

The Japanese Meteorological Agency (JMA), the Korean Meteorological Administration (KMA) and the China Meteorological Administration (CMA) make additional satellite data and services available to Members to assist with the analysis and forecasting of tropical cyclones.

a) Emergency Support Mechanism of FENGYUN Satellite (FY ESM) - CMA

FY ESM is open to international users who made a request once visited by such extreme events as typhoon, heavy rain, severe convection, forest or grassland fire and sand and dust storm. In this case, the on-duty FY satellite is activated to initiate highly frequent observation of a given area at an interval of up to 5 minutes, processing and generating images and quantitative products, which are provided through such channels as CMACast, Internet and direct satellite broadcasting, to inform the processes of disaster preparedness, mitigation and relief in a timely fashion. Details on procedure for requesting additional satellite data can be found at: https://fy4.nsmc.org.cn/service/en/emergency/index.html

b) Himawari Satellite Data (HimawariRequest Service) - JMA

The Advanced Himawari Imager (AHI) on board Himawari-8/9 is capable of frequent and flexible observation, providing Full-Disk images of the earth every 10 minutes and regional images with shorter intervals. The Himawari Request Service allows National Meteorological and Hydrological Services to request particular Target Area observations in order to leverage this additional satellite data. JMA provides the service in collaboration with the Australian Bureau of Meteorology (BoM) based on the partnership on meteorological satellites between the two organizations. Details on procedure for requesting additional satellite data through the Bureau of Meteorology can be found at: https://www.jma.go.jp/jma/jma-eng/satellite/HimawariRequest.html

c) Rapid-scan observation - KMA

The GEO-KOMPSAT-2A Advanced Meteorological Imager (AMI) is providing Full-Disk images at longitude of 128.2E every 10 minutes and regional images with every two minutes through landline-based network via the National Meteorological Satellite Center (NMSC) website (http://nmsc.kma.go.kr/enhome/html/main/main.do) and real-time FTP for the National Meteorological and Hydrological Services (NMHSs).
KMA will provide Request-based rapid-scan observation imagery services for target monitoring disaster driven-weather such as typhoons, forest fire and volcanic ash every 2 minutes over the RA II and RA V region. The dedicated webpage for users to request rapid-scan observations on the NMSC is at:
http://datasvc.nmsc.kma.go.kr/datasvc/html/special/specialIntro.do?lang=en

ATTACHMENT 2A: List of tropical cyclone names withdrawn from use due to a cyclone's negative impact on one or more countries

TROPICAL CYCLONE NAMES RETIRED FROM THE AUSTRALIAN AoR

Name	Year	Region list	Name	Year	Region list	Name	Year	Region list
Abigail	2001	Brisbane	George	2007	Perth	Mark	1992	Brisbane
Ada	1970	Brisbane	Gertie	1971	Brisbane	Megan	2024	Australian
Agnes	1995	Brisbane	Gertie	1995	Perth	Monica	2007	Brisbane
Alby	1978	Perth	Glenda	2006	Perth	Monty	2004	Perth
Althea	1971	Brisbane	Graham	2003	Perth	Naomi	1994	Perth
Annette	1994	Perth	Gwenda	1999	Perth	Ned	1990	Perth
Audrey	1964	Brisbane	Hamish	2009	Australian	Nina	1992	Brisbane
Barry	1996	Brisbane	Harold	2020	Australian	Nigel	1985	Brisbane
Beth	1976	Brisbane	Harvey	2006	Brisbane	Oliver	1993	Brisbane
Betsy	1992	Brisbane	Heidi	2011	Australian	Olivia	1996	Darwin
Bobby	1995	Perth	Helen	2008	Darwin	Olwyn	2015	Australian
Carlos	2011	Australian	Herbie	1988	Perth	Orson	1989	Perth
Charlie	1987	Brisbane	Ian	1992	Perth	Oswald	2012	Australian
Chloe	1984	Perth	Ilona	1988	Perth	Pearl	1994	Perth
Chris	2002	Perth	Ilsa	2023	Australian	Pedro	1989	Perth
Christine	2013	Australian	Ingrid	2006	Brisbane	Quang	2015	Australian
Celeste	1996	Brisbane	Inigo	2003	Perth	Quenton	1983	Perth
Clare	2006	Perth	Ita	2013	Australian	Rachel	1997	Darwin
Cliff	1981	Brisbane	Ivor	1990	Brisbane	Rhonda	1997	Perth
Connie	1987	Perth	Jane	1983	Perth	Roger	1993	Brisbane
Daisy	1972	Brisbane	Jasmine	2012	Australian	Rona	1999	Brisbane
Damien	2020	Australian	Jason	1987	Brisbane	Rosita	2000	Perth
Daphne	1982	Perth	Jasper	2024	Australian	Rusty	2012	Australian
David	1976	Brisbane	Joan	1975	Perth	Sam	2000	Perth
Debbie	2017	Australian	John	1999	Perth	Sandy	1985	Brisbane
Delilah	1988	Brisbane	Joy	1990	Brisbane	Seth	2022	Melbourne
Dinah	1967	Brisbane	Justin	1997	Brisbane	Sharon	1994	Perth
Dora	1971	Brisbane	Katrina	1998	Brisbane	Steve	2000	Brisbane
Dominic	1982	Brisbane	Kathy	1984	Brisbane	Sid	1988	Darwin
Elaine	1999	Perth	Kay	1987	Perth	Simon	1980	Brisbane
Elinor	1983	Brisbane	Kerry	1979	Brisbane	Tasha	2010	Australian
Elsie	1987	Perth	Kirrily	2024	Australian	Ted	1976	Brisbane
Emily	1972	Brisbane	Kirsty	1996	Perth	Tessi	2001	Brisbane
Erica	2003	Brisbane	Lam	2015	Australian	Thelma	1998	Darwin
Ethel	1996	Brisbane	Lance	1984	Brisbane	Tina	1992	Perth
Fay	2004	Darwin	Larry	2006	Brisbane	Tracy	1974	Darwin
Felicity	1989	Brisbane	Laurence	2010	Australian	Trevor	2019	Australian
Fergus	1996	Brisbane	Lena	1984	Perth	Trixie	1975	Perth
Fifi	1983	Perth	Lindsay	1986	Perth	Vance	1999	Darwin
Fiona	1971	Brisbane	Lua	2011	Australian	Veronica	2019	Australian
Flora	1964	Brisbane	Madge	1973	Brisbane	Violet	1995	Brisbane
Fran	1992	Brisbane	Magda	2010	Australian	Warren	1995	Brisbane
Frank	1984	Perth	Marcia	2015	Australian	Wanda	1974	Brisbane
Freddy	2023	Australian	Marcus	2018	Australian	Winifred	1986	Brisbane
Gabrielle	2023	Australian	Margot	1985	Perth			

*A single list of names for the Australian AoR was introduced for the start of the 2008/09 season

TROPICAL CYCLONE NAMES RETIRED FROM THE RSMC NADI AoR

Name	Season	Name	Season	Name	Season
Agatha	1971/72	Helene	n/a	Percy	2004/05
Alison	1974/75	Heta	2003/04	Pola	2019/20
Ami	2002/03	Hina	1996/97	Polly	1992/93
Ana	2020/2021	Ian	2013/14	Prema	1992/93
Anne	1987/88	Ima	1985/86	Raja	1986/87
Atu	2010/11	Isaac	1981/82	Rewa	1993/94
Bebe	1972/73	Ivy	2003/04	Robert	1976/77
Beni	2002/03	Joni	1992/93	Ron	1997/98
Beti	1995/96	Josie	2017/18	Rosie	1970/71
Betsy	1991/92	Joti	1982/83	Sally	1986/87
Bob	1977/78	Judy	2022/23	Sarai	2019/20
Bola	1987/88	Juliette	n/a	Sina	1990/91
Carlotta	1971/72	Keli	1996/97	Sose	2000/01
Charles	1977/78	Keni	2017/18	Susan	1997/98
Cilla	2002/03	Kevin	2022/23	Tahmar	1980/81
Cliff	2006/07	Kim	1999/00	Theodore	1993/94
Cody	2021/22	Kina	1992/93	Tia	1991/92
Cook	2016/17	Koko	n/a	Tina	1973/74
Cora	1998/99	Lili	1988/89	Tino	2019/20
Daman	2007/08	Lisa	1982/83	Tomas	2009/10
Dani	1998/99	Lola	2023/24	Trina	2001/02
Diana	1977/78	Lottie	1973/74	Tui	1997/98
Donna	2016/17	Lusi	2013/14	Tusi	1997/98
Drena	1996/97	Mal	2023/24	Ula	2015/16
Eddie	1980/81	Marion	1976/77	Ului	2009/10
Elsa	1975/76	Mark	1982/83	Uma	1986/87
Eric	1984/85	Martin	1997/98	Ursula	1997/98
Erica	2002/03	Meli	1978/79	Val	1991/92
Esau	1991/92	Meena	2004/05	Vania	2010/11
Eseta	2002/03	Mick	2009/10	Veena	1982/83
Evan	2012/13	Namu	1985/86	Veli	1997/98
Fay	1978/79	Nancy	2004/05	Vivienne	1971/72
Flora	1974/75	Nigel	1984/85	Waka	2001/02
Fran	1991/92	Nina	1992/93	Wally	1979/80
Frank	1998/99	Ofa	1989/90	Wasa	1991/92
Freda	2012/13	Olaf	2004/05	Watorea	1975/76
Funa	2007/08	Oli	2009/10	Wendy	1971/72
Gavin	1996/97	Oscar	1982/83	William	1994/95
Gordon	1978/79	Osea	1997/98	Wilma	2010/11
Gene	2007/08	Pam	2014/15	Winston	2015/16
Gita	2017/18	Pat	2009/10	Yasa	2020/21
Gyan	1981/82	Pate	2009/10	Yasi	2010/11
Hal	1977/78	Paula	2000/01	Zoe	2002/03
Harry	1988/89	Peni	1989/90		

TROPICAL CYCLONE NAMES RETIRED FROM THE TCWC PORT MORESBY AoR

Name	Year
Adel	1993
Agi	1988
Aivu	1989
Epi	2003
Manu	1986
Upia	2002
Guba	2007

TROPICAL CYCLONE NAMES RETIRED FROM THE TCWC JAKARTA AoR

Name	Year
Durga	2008
Mawar	2012
Mangga	2020
Seroja	2021
Pisang	2021

COMBINED LIST OF ALL TROPICAL CYCLONE NAMES RETIRED FROM THE REGION

Abigail	Daphne	Guba	Kim	Oliver	Susan
Ada	David	Gwenda	Kina	Olivia	Tahmar
Adel	Debbie	Gyan	Kirrily	Olwyn	Tasha
Agatha	Delilah	Hal	Kirsty	Orson	Ted
Agi	Diana	Hamish	Koko	Oscar	Tessi
Agnes	Dinah	Harold	Lam	Osea	Thelma
Aivu	Dominic	Harry	Lance	Oswald	Theodore
Alby	Donna	Harvey	Larry	Pam	Tia
Alison	Dora	Heidi	Laurence	Pat	Tina
Althea	Drena	Helen	Lena	Pate	Tino
Ami	Durga	Helene	Lili	Paula	Tomas
Ana	Eddie	Herbie	Lindsay	Pearl	Tracy
Anne	Elaine	Heta	Lisa	Pedro	Trevor
Annette	Elinor	Hina	Lola	Peni	Trina
Atu	Elsa	Ian	Lottie	Pisang	Trixie
Audrey	Elsie	Ilona	Lua	Percy	Tui
Barry	Emily	Ilsa	Lusi	Pola	Tusi
Bebe	Epi	Ima	Madge	Polly	Ula
Beni	Eric	Inigo	Magda	Prema	Ului
Beth	Erica	Ingrid	Mal	Quang	Uma
Beti	Esau	Isaac	Mangga	Quenton	Upia
Betsy	Eseta	Ita	Manu	Rachel	Ursula
Bob	Ethel	Ivor	Marcia	Raja	Val
Bobby	Evan	Ivy	Marcus	Rewa	Vance
Bola	Fay	Jane	Margot	Rhonda	Vania
Carlos	Felicity	Jasmine	Marion	Robert	Veena
Carlotta	Fergus	Jason	Mark	Roger	Veli
Celeste	Fifi	Jasper	Martin	Ron	Veronica
Charles	Fiona	Joan	Mawar	Rona	Violet
Charlie	Flora	John	Meena	Rosie	Vivienne
Chloe	Fran	Joni	Megan	Rosita	Waka
Chris	Frank	Josie	Meli	Rusty	Wally
Christine	Freda	Joti	Mick	Sally	Wanda
Cilla	Freddy	Joy	Monica	Sam	Warren
Clare	Funa	Judy	Monty	Sandy	Wasa
Cliff	Gabrielle	Juliette	Namu	Sarai	Watorea
Cody	Gavin	Justin	Nancy	Seroja	Wendy
Connie	Gene	Kathy	Naomi	Seth	William
Cook	George	Katrina	Ned	Sharon	Wilma
Cora	Gertie	Kay	Nigel	Sid	Winifred
Daisy	Gita	Keli	Nina	Simon	Winston
Daman	Glenda	Keni	Ofa	Sina	Yasa
Damien	Gordon	Kerry	Olaf	Sose	Yasi
Dani	Graham	Kevin	Oli	Steve	Zoe

CHAPTER 3: TROPICAL CYCLONE INFORMATION AVAILABLE IN THE REGION

3.1 Introduction

This chapter describes the forecasts, warnings and advisories that Members issue under agreed international responsibilities and other products that cover significant areas of the Region. It includes criteria and formats, frequencies and times of issue and current international addressees.

3.2 Forecast information provided by Meteorological Centres within the region

This section does not describe the extensive range of products issued by Members for primary use within their own countries. However RSMC NADI provides forecasts and warnings to the general population of Banaba, Fiji, Kiribati, Nauru, Niue, Tokelau, Tuvalu and Cook Islands and therefore these are described in detail. New Caledonia and French Polynesia provide forecast products for large areas of the region. New Caledonia provide forecast products for Wallis and Futuna. Therefore, those products are described in detail.

3.2.1 RSMC NADI

3.2.1.1 Special Weather Bulletins

a) Purpose

Special weather bulletins are intended to:

(i) Alert a community to the developing threat of a tropical cyclone, or

(ii) Provide warnings of tropical cyclones or other disturbances, or

(iii) Cancel "alert" or "warning"

b) Overview

Special Weather Bulletins either contain or cancel a TROPICAL CYCLONE ALERT or a TROPICAL CYCLONE WARNING (GALE, STORM or HURRICANE WARNING). Details of TROPICAL CYCLONE ALERT BULLETINS are provided in Section 3.2.1.2 below and of GALE, STORM and HURRICANE WARNINGS are provided in Section 3.2.1.3 below.
All intermediate bulletins will be prefixed by the word FLASH.

c) Criteria for first issue

These depend on the type of Special Weather Bulletin and are detailed below in the description of the specific bulletin.

d) Frequency and times of subsequent issues

These vary with the type of Special Weather Bulletin and are detailed below in the description of the specific bulletin.

e) Review

All Special Weather Bulletins are kept under constant review but are reviewed typically every three hours.

f) Amendment criteria

When new information indicates a significant change in the situation and invalidating the current Special Weather Bulletin, an intermediate bulletin is issued as soon as possible to advice recipients of the new situation. Such a Special Weather Bulletin is brief and issued without delay. It includes essential information on the position and movement of the cyclone, the new areas expected to be affected and the time, and it states that a full bulletin will follow as soon as possible. Intermediate bulletins are included in the numbered sequence of Special Weather Bulletins.

g) Recipients

Special Weather Bulletins are issued to the following islands or groups of islands:

Cook Islands
Fiji
Kiribati
Nauru
Niue
Tokelau
Tuvalu

h) Format

Special Weather Bulletins are self-contained to the extent that they do not refer to information in other advisories or bulletins.

Special Weather Bulletins are written in simple, unambiguous English that can be translated into local languages with a minimum of risk of misinterpretation. Sentences are short and as far as possible technical terms are avoided.

A continuous sequence of Special Weather Bulletins for a particular island group is numbered sequentially from BULLETIN Number One for the first issue.

If a Special Weather Bulletin sequence ends for a time and is then resumed for the same cyclone and for the same island group, the Bulletin number sequence resumes.

The Bulletin identification includes the Bulletin sequence number, the appropriate ALERT or WARNING designation, the originating office and time and date of issue (UTC).

Example:

"SPECIAL WEATHER BULLETIN NUMBER SIX FOR TONGA ON TROPICAL CYCLONE YALO ISSUED FROM RSMC NADI AT 0800 UTC ON 8 DECEMBER 1987.

TROPICAL CYCLONE ALERT/ WARNING……

A HURRICANE WARNING IS IN FORCE……..

A STORM WARNING IS IN FORCE……..

A GALE WARNING IS IN FORCE……..

A TROPICAL CYCLONE ALERT IS IN FORCE……..

The end of the first Special Weather Bulletin (BULLETIN NO.1) includes a request for it to be acknowledged, e.g. "PLEASE ACKNOWLEDGE RECEIPT OF THIS BULLETIN". It is acknowledged by the addressee on receipt.

i) Termination of special weather bulletins

When the threat to an island group ceases or the danger has passed a cancellation message will be sent to the addressees of the original Alerts or Warnings. The message includes explanatory text, e.g.

"TROPICAL CYCLONE ALICE HAS NOW WEAKENED AND MOVED AWAY TO THE SOUTH. ALL WARNINGS FOR TUVALU ARE NOW CANCELLED."

Or

"TROPICAL CYCLONE CAROL HAS TURNED AWAY SOUTHWESTWARD AND NO LONGER THREATENS FIJI. THE TROPICAL CYCLONE ALERT FOR FIJI IS CANCELLED".

Alerts or Warnings are cancelled only when there is a high degree of confidence that they are no longer required.

j) Response from user States

Receipt of the BULLETIN Number ONE is promptly acknowledged. Whenever subsequent scheduled bulletins are not received, RSMC NADI is notified within half an hour of expected issue time. If an acknowledgement message is not received at RSMC NADI it will seek, by all means possible, to ascertain if special weather bulletins have been correctly received.

RSMC NADI is also notified of the receipt of all intermediate Special Weather Bulletins, prefixed FLASH.

3.2.1.2 Tropical cyclone alert

a) Purpose

A Tropical Cyclone Alert bulletin gives information on the development of an incipient cyclone or the progress of a cyclone still some distance away, if there is a significant probability that winds may reach gale force or stronger within 24 to 48 hours. It is intended to give members of the community time to check their preparedness and to put them on the alert for possible warnings to follow.

b) Time of issue of the first Alert

The issue of the first Alert is timed, as far as possible, in daylight broadcasting hours, etc., to ensure it reaches the greatest number of people as early as possible

c) Time and frequency of subsequent Alerts

The time of the next scheduled Alert is included in the current Alert although it may be necessary to issue an Alert at an intermediate time. They are issued at least six hourly.

d) Content

Tropical Cyclone Alerts are expressed in rather general terms and normally apply to a whole island group such as Fiji or the Southern Cook Group.

Examples are given in the Annex of the Chapter 3

3.2.1.3 Tropical cyclone warnings

a) Criteria for first issue

Tropical cyclone warnings for a population are issued in Special Weather Bulletins as soon as it is apparent that gale, storm or hurricane force winds respectively are expected within 24 hours.

b) Time of first issue

As far as possible, warnings are issued to reach the public in time to allow several hours of daylight in which action will be taken such as to dock boats safely and to take other protective measures against severe conditions.

To achieve this, every effort is made to issue warnings:

(i) Approximately 24 hours ahead of dangerous conditions,

(ii) At times when the warnings can most readily reach the greatest proportion of the community, e.g. early in the working day or during the normal hours of the local broadcasting station.

c) Frequency of issue of subsequent warnings

Subsequent warnings are normally issued at three-hour intervals unless it is necessary to issue a revised warning in an intermediate Special Weather Bulletin.

d) Format

Special Weather Bulletins relating to tropical cyclones issued as Warnings follow the general WMO format for marine warnings. However, as far as possible they are expressed in non-technical language and normally include:

i. Identification of disturbance e.g. TROPICAL CYCLONE HELEN.
ii. Location of disturbance with reference to well-known landmarks, with bearing expressed in compass points and distances in nautical miles, e.g. "TROPICAL CYCLONE SUSAN WAS CENTRED ABOUT 100 NAUTICAL MILES WEST OF NADI OR NEAR 18 SOUTH 176 EAST AT 6AM".
iii. Intensity expressed in terms of wind force with an indication of the potential for damage. It is desirable, especially when very strong winds are expected, to supplement the descriptive term with the average wind speed in knots, together with an estimate of the highest gusts, e.g. "WITHIN 30 NAUTICAL MILES OF ITS CENTRE TROPICAL CYCLONE VICTOR HAS WINDS OF DESTRUCTIVE STORM FORCE UP TO ABOUT 55 KNOTS WITH GUSTS TO ABOUT 80 KNOTS ..."

Or

"......WITH VERY DESTRUCTIVE HURRICANE FORCE WINDS NEAR THE CENTRE PROBABLY REACHING ABOUT 70 KNOTS WITH GUSTS TO ABOUT 100 KNOTS ..... "

Or

"...WITH GALES UP TO ABOUT 45 KNOTS AND GUSTS TO ABOUT 65 KNOTS."

iv. Expected movement, with speed in knots.

v. Forecast position, at some convenient time, expressed with reference to well-known landmarks, e.g.
"THE CYCLONE IS EXPECTED TO MOVE SOUTHEASTWARD ACROSS VANUA LEVU TONIGHT AND BE CLOSE TO TAVEUNU AROUND 6 AM TOMORROW MORNING".

vi. Specific islands or districts likely to experience hurricane force winds or storm force winds. Most listeners are unable to identify the expected path immediately on a map but listen for mention of damaging winds in their own island or district, e.g. "....DESTRUCTIVE STORM FORCE WINDS WITH AVERAGE SPEEDS UP TO 60 KNOTS AND GUSTS TO 80 KNOTS ARE EXPECTED OVER NAMENA, KORO, CICIA, NAYAU, VANUA MASI, MOALA, KABARA, FULAGA, AND NEARBY SMALLER ISLANDS FOR A BRIEF TIME TONIGHT OR EARLY IN THE MORNING".

It is not always possible to be so specific, e.g.

".....REACHING STORM FORCE OVER THE YASAWA AND MAMANUCA GROUPS AND THE WESTERN HALF OF VITI LEVU".

vii. Indication of rainfall intensity, given in qualitative terms with a general indication of the chances of flooding, e.g.
"THE CYCLONE IS VERY SLOW MOVING AND RAINFALL IS EXPECTED TO BE VERY HEAVY AND PROLONGED OVER------ AND MAJOR FLOODING IS LIKELY."

viii. Likelihood of storm surge, given in qualitative terms and non-technical language, e.g.:
"MODERATE (OR SEVERE) RAPID FLOODING FROM THE SEA POSSIBLE IN NORTHERN COASTAL AREAS OF VITI LEVU A FEW HOURS BEFORE THE CENTRE PASSES BY."

ix. Indications of damaging swell and waves in coastal areas, e.g.:
"HIGHLY DAMAGING SWELL AND HIGH WAVES ARE EXPECTED IN THE NORTHERN COASTAL AREAS."

x. Supplementary Information for Domestic Marine Interests.

- extent of area affected, usually expressed as radius to which hurricane, storm, or gale force winds are expected to extend, and
- The sea conditions, e.g.
..... EXPECT WINDS OF STORM FORCE WITH VERY HIGH SEAS WITHIN ABOUT 50 NAUTICAL MILES OF CENTRE AND GALE FORCE WITH VERY ROUGH TO HIGH SEAS OUT TO ABOUT 150 NAUTICAL MILES ..... "

Or

".....WITH GALES AND VERY ROUGH TO HIGH SEAS OUT TO ABOUT 200 NAUTICAL MILES .... "

3.2.1.4 Tropical Cyclone Naming Bulletin

a) Purpose

Tropical Cyclone Naming Bulletins are designed to inform of the official naming of a tropical cyclone within the RSMC NADI area of responsibility.

b) General description

The bulletin simply notes the tropical depression (including identification number) that has been named by RSMC NADI.

c) Time and frequency of issue

As soon as possible after a tropical cyclone is deemed to have formed within the RSMC NADI area of responsibility. This should be issued an hour or so before the name is used in warnings or broadcasts to enable Members to advise their local stakeholders.

d) Contents

The message contains the following as essential information:

i. Bulletin header: NWPS01 NFFN YYGGgg (where YYGGgg is the day, hour and minute in UTC the bulletin was prepared or the reporting time of the contents within it).

ii. Identification number of the tropical depression that has formed into a tropical cyclone.

iii. Location of the tropical cyclone at the time of naming.

iv. Date and time the tropical cyclone was named.
v. Name of the tropical cyclone.

TC name will be used in the subsequent warning that will follow.

3.2.1.5 Tropical disturbance summaries

a) Purpose

Tropical disturbance summaries are designed to give advance information of the possibility of a tropical cyclone forming out of an existing tropical disturbance.

b) General description

The summaries describe each significant tropical disturbance and the potential for development into a tropical cyclone in the area Equator to 25°S, 160°E to 120°W.

c) Time and frequency of issue

The summaries are issued daily at 2300 UTC and reviewed at 0900 UTC. Bulletins may also be issued outside the period 1 November to 30 April in the event of a tropical disturbance showing signs of possible development into a tropical cyclone.

d) Contents

The message contains the following as essential information:

i. Bulletin heading WWPS21 NFFN yygggg;
ii. Identification of the message-issuing office (NADI), date and time of issue (UTC);
iii. The analysis and the nature of the data it is based on;
iv. The potential for development of the disturbance into a tropical cyclone (LOW, MODERATE, HIGH) during the next hours;
v. SIGNIFICANT TROPICAL DISTURBANCES ANALYSED OR FORECAST IN THE AREA".

3.2.1.6 Tropical disturbance advisory

a) Purpose

i. The information is provided as guidance for use in:
ii. The preparation of forecasts, warnings and SIGMET messages where necessary;
iii. Situation interpretations to national organizations dealing with cyclone emergencies;
iv. Background briefing material.

b) General description

This Advisory describes each significant tropical disturbance in the area EQUATOR to 25S, 160E to 120W. Separate distinctly identifiable messages are disseminated on each disturbance if more than one exists at any one time.

c) Criteria for first issue

The first message is issued immediately there is reasonable evidence of a tropical disturbance or a depression developing into a tropical cyclone within the next 48 hours.

d) Time and frequency of subsequent advisories

Subsequent issues are made six hourly close to 0200, 0800, 1400 and 2000 UTC. However, if any rapid or unexpected changes occur in movement or development, intermediate advisories are issued.

e) Contents

The message contains information regarding:

i. Identification of the message (disturbance serial number, issuing office (NADI), date/time (UTC));
ii. The analysis and the nature of the data it is based on;
iii. The confidence in the analysis;
iv. The prognosis of location and intensity from 12 to 48 hours.
v. Time of next issue.

A separate Tropical Disturbance Advisory is issued for each tropical disturbance and carries a serial number preceded by an alphabetical letter "A" for the first disturbance, "B" for the second, etc. (the letter being retained throughout the entire life of the disturbance).

Examples are given in the Annex of the Chapter 3

3.2.1.7 Marine gale, storm-force and hurricane-force wind warnings

a) Purpose

Wind warnings are required for the purpose of the WWMIWS and broadcast on SafetyNET.

b) Criterion for first issue

The first of a series of warnings is issued as soon as gale, storm-force or hurricane-force winds are expected in the area of responsibility within 24 hours.

c) Frequency of subsequent issues

Subsequent issues are six hourly unless a major amendment is necessary at an intermediate time.

d) Format and content of warnings

These are issued in accordance with the standard international service standards described in the WMO Manual on Marine Meteorological Services (WMO No.558), and WMO template for marine warnings (see Attachment 3A).

RSMC NADI is a Preparation Service for METAREA X and XIV of the WWMIWS and must send their products to Australia and New Zealand (as Issuing Services respectively) for broadcast on SafetyNET to mariners at sea.

3.2.1.8 Tropical cyclone advisories for aviation in accordance with paragraph. 2.1.3.

a) Purpose

The Advisories are required for the issuance of SIGMET messages by designated meteorological watch offices (MWO) for the purpose of international air navigation in the RSMC NADI Tropical Cyclone Advisory area of responsibility from Equator to 40°S, 160°E to 120°W.

b) General description

The Advisories describe the current locations, intensities (central pressure and maximum surface winds), speed and direction of movement of a tropical cyclone as well as its 6-hourly forecast positions and intensities out to 24 hours.

c) Time and frequency of issue

The Advisories shall be issued for an active or developing tropical cyclone when the maximum of the 10-minute mean surface wind speed is expected to reach or exceed 34 knots during the period covered by the advisory (24 hours), and thereafter updated every 6 hours for as long as a system remains a tropical cyclone.

d) Contents

The message contains the following as essential information:

i. Bulletin heading FKPS01 NFFN yygggg;
ii. Identification of the message, date and time of issue in UTC time, issuing office (TCAC NADI);
iii. Name of cyclone;
iv. Number of advisory;
v. Position of cyclone centre in degrees and minutes and CB extent;
vi. Direction and speed of movement;
vii. Central pressure in hPa; maximum 10-minute average surface wind;
viii. Forecast positions together with maximum 10-minute surface winds at 6-hourly intervals out to 24 hours;
ix. Plain language remarks;
x. Next issue time in YYYYMMDD/ggggz.

Example is given in the Annex of the Chapter 3

3.2.1.9 Tropical Cyclone Outlook

a) Purpose

5-day TC Outlooks are designed to give advance information of existing tropical cyclones and the potential of a tropical cyclone forming out of an existing tropical disturbance as well as the genesis of a totally new cyclone inside the area Equator to 25°S, 160°E to 120°W in the next 5 days.

b) General description

The Outlooks describe the existence of a tropical cyclone and the potential of each existing significant tropical disturbance developing into a tropical cyclone as well as the genesis of a totally new cyclone in the area Equator to 25°S, 160°E to 120°W in the next 5 days.

c) Time and frequency of issue

The Outlooks are issued daily at 0400 UTC during the tropical cyclone season. Bulletins may also be issued outside period 1 November to 30 April in the event of a tropical disturbance showing signs of possible development into a tropical cyclone.

d) Contents

The message contains the following as essential information:

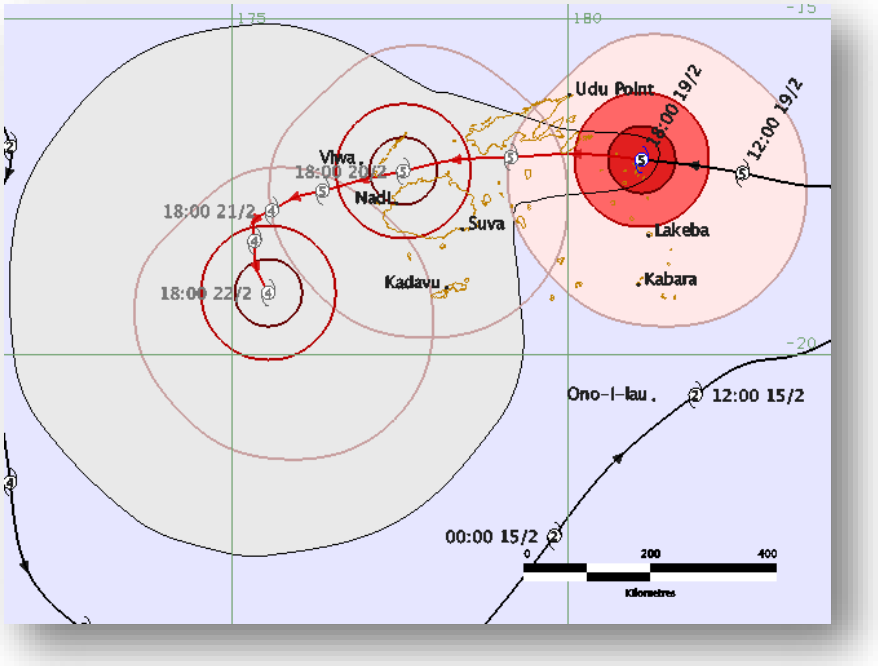
i. Bulletin heading FKPS20 NFFN yygggg;
ii. Identification of the message-issuing office (NADI), date and time of issue (UTC);
iii. Existing tropical cyclones;
iv. The potential (LOW, MODERATE, HIGH) for formation of a tropical cyclone from an existing tropical disturbance in the next 3 days;
v. The potential (LOW, MODERATE, HIGH) for genesis of a new tropical cyclone in the next 5 days;
vi. The next issue time.

Example is given in the Annex of the Chapter 3

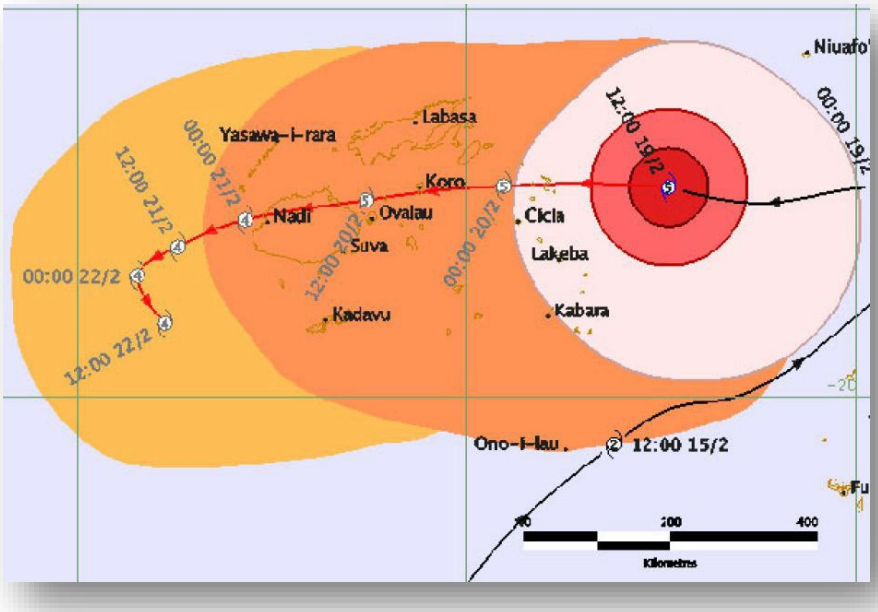
3.2.1.10 Tropical Cyclone Track and Threat Maps

Tropical Cyclone Track and Threat Maps are issued whenever there is an active tropical cyclone in the RSMC AOR or a tropical low is forecast to become a tropical cyclone. Updated maps are issued with every update of the relevant product issued by the RSMC. Examples are shown below for Tropical Cyclone Winston.

The Tropical Cyclone Track Map shows the previous track of the cyclone, the consensus forecast track, the expected extent of gale, storm and hurricane force winds and the grey zone of uncertainty within which the centre of the cyclone is expected to be located.



The Tropical Cyclone Threat Map shows the areas expected to be impacted in the following 24, 48 and 72 hours after the time of issue.



3.2.1.11 Special Advisory for the Solomon Islands

a) Purpose

The Special Advisory for the Solomon Islands provides information on tropical cyclones and developing tropical lows that have the potential to affect communities of the Solomon Islands.

b) Criteria for first issue

The Special Advisory for the Solomon Islands will be issued as soon as a tropical cyclone or developing tropical disturbance is considered likely to cause gales over any islands within 48 hours and within the area 5°S 160°E, 11.5°S 171°E, 13°S 171°E, 13°S 160°E and 5°S 160°E The first Advisories is issued as soon as the need becomes apparent.

c) Frequency and times of subsequent issues

Subsequent issues are made six-hourly at 0200, 0800, 1400 and 2000 UTC. The frequency of the advisories may be increased to 3-hourly upon request from the Solomon Islands Meteorological Service. The frequency may only be increased as soon as a tropical cyclone or developing tropical disturbance is considered likely to cause gales about any of the provinces of the Solomon Islands within 24 hours.

d) Content

i. Tropical Cyclone Name and Category
ii. Date/Time
iii. Latitude
iv. Longitude
v. Movement Direction and Speed
vi. Maximum 10-Minute Wind and forecast Wind
vii. Radius of gales
viii. Radius of storm force winds
ix. Radius of hurricane force winds
x. Forecast Position
xi. The next advisory issued time

3.2.2 TCWC Melbourne

The Australian Bureau of Meteorology provides a range of international tropical cyclone services for the Southeast Indian Ocean and South Pacific Ocean including:

- Ocean Wind Warnings
- CREX Bulletins
- Tropical Cyclone Advisory (Aviation)
- Satellite Analysis Bulletin - 0630UTC issue with 0030UTC issues done on a best endeavours basis
- Special Advisory for the Solomon Islands

Details around these products, including samples, can be found in the Tropical Cyclone Service Level Specification at http://www.bom.gov.au/cyclone/tropical-cyclone-knowledge-centre/warnings/Tropical_Cyclone_Service_Level_Specification.pdf.

3.2.3 TCWC Port Moresby

3.2.3.1 Ocean gale, storm-force and hurricane-force wind warnings

These are issued in accordance with the standard international service standards described in the WMO Manual on Marine Meteorological Services (WMO No.558), and WMO template for marine warnings (see Attachment 3A).

Port Moresby is a Preparation Service for METAREA X of the WWMIWS and must send their products to Australia (as Issuing Service) for broadcasting on SafetyNET to mariners at sea.

a) Criterion for first issue

The first of a series is issued as soon as gale force or storm force winds are expected in the area of responsibility within 24 hours.

b) Time and frequency of subsequent issues

Subsequent issues are six hourly at 0130, 0730, 1330 and 1930 UTC unless a major amendment is necessary at an intermediate time.

3.2.4 TCWC Wellington

3.2.4.1 Ocean gale, storm-force and hurricane-force wind warnings

These are numbered sequentially and are issued in accordance with the standard international service standards described in the WMO Manual on Marine Meteorological Services (WMO No.558), and WMO template for marine warnings (see Attachment 3A).

New Zealand is an Issuing Service for METAREA XIV of the WWMIWS and is responsible for broadcasting the products on SafetyNET to mariners at sea.

a) Criterion for first issue

The first of a series is issued as soon as gale force, storm force winds or hurricane force winds are expected in the area of responsibility within 24 hours.

b) Time and frequency of subsequent issues

Subsequent issues are six hourly at approximately 0130, 0730, 1330 and 1930 UTC unless a significant amendment is necessary at an intermediate time.

Whenever there is a Tropical Cyclone south of 25S and between 160E and 120W the input for the Aviation Tropical Cyclone Advisory issued by TCAC-NADI under 3.2.1.8 is provided by Wellington.

3.2.4.2 Tropical Cyclone Potential Bulletin

a) Purpose

The Tropical Cyclone Potential Bulletin is designed to provide information on current and developing cyclones in the South Pacific and Coral Sea in the next few days.

b) General description

The TC Potential Bulletin describes the current status of each active tropical cyclone and provides forecast statements of possible cyclone formation for any existing or developing disturbances within the next five days. The potential for formation of each disturbance in the forecast period is stated as low, moderate or high relating to one, two or three chances in five respectively.

c) Time and frequency of issue

The TC Potential Bulletin is issued daily around 0000 UTC during the tropical cyclone season, between 1 November and 30 April, and at other times if a tropical disturbance shows signs of development into a tropical cyclone.

d) Contents

i. Current status of cyclone activity;
ii. Forecast until 1200 UTC "tomorrow";
iii. Outlook for the following three days.

3.2.5 TCWC Jakarta

3.2.5.1 Ocean Gale, Storm-force and Hurricane-force wind warnings

These are issued in accordance with the standard international service standards described in the WMO Manual on Marine Meteorological Services (WMO No.558) and WMO template for marine warnings (see Attachment 3A).

Indonesia is a Preparation Service for METAREA XI of the WWMIWS and send their products to China (as Issuing Service) for broadcasting on SafetyNET to mariners at sea.

a) Criterion for first issue

The first of a series is issued as soon as gale force or storm force winds are expected in the area of responsibility with 24 hours.

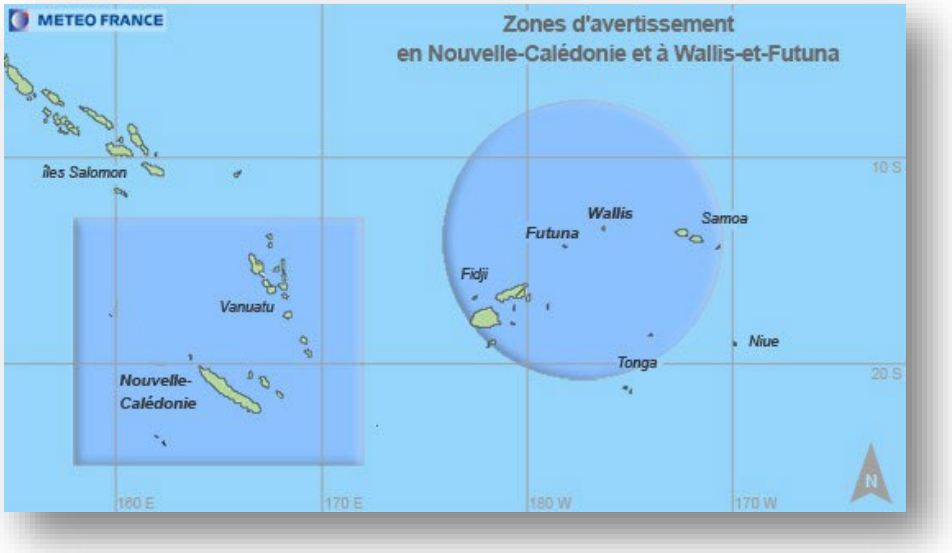
b) Time and frequency of subsequent issues

Issues are six hourly at 0130, 0730, 1330 and 1930 UTC unless a major amendment is necessary at an intermediate time.

3.2.6 New Caledonia Meteorological Service, Nouméa

3.2.6.1 Warning areas: New Caledonia Metservice areas of responsibility

New Caledonia warning area is 13S to 25S and 158E to 172E. Wallis-and-Futuna warning area is a 400 nm circle centred on Wallis and Futuna islands.



3.2.6.2 Tropical Cyclone Advisory / Bulletin de prévision cyclonique

a) Purpose

The tropical cyclone advisory provides analysis details and forecast positions, uncertainties and intensity forecasts at 6-hour intervals to 72 hours for tropical cyclones and some developing tropical depressions, in the area of responsibilities of New Caledonia or Wallis-and Futuna.

b) Criterion for first issue

The first Advisory is issued whenever a tropical cyclone is located within or forecast in the next 12 hours to be in, the area of responsibility.

c) Frequency and time of subsequent issues

Tropical Cyclone Advisories are issued at 0230, 0830, 1430, 2030 UTC for category 2 or higher, tropical cyclones and at 0830, 2030 UTC for category 1 tropical cyclones.

d) Content

The message contains the following essential information:

i. Bulletin header;
ii. Issuing office, time and date of issue, sequential message number;
iii. Disturbance type and name of system;
iv. Time of analysis;
v. Position in degrees latitude and longitude at analysis time; uncertainty in nm
vi. Direction and speed of movement;
vii. Maximum 10-minute wind speed and maximum wind gust; central pressure
viii. Radii of 34, 48 and 64-knot winds in four sectors and radii of maximum winds
ix. 6-hour forecast position, accuracy in nm and maximum wind speed in kt
x. Next issue time

Example is given in the Annex of the Chapter 3

3.2.6.3 Marine high sea gale, storm and hurricane force wind warning / Bulletin météorologique spécial (BMS)

a) **Purpose**

Wind warnings are required as soon as gale-force winds are forecast in the New Caledonia area of responsibility within 24 hours and are broadcast on GTS, on www.meteo.nc and on VHF 65.

b) Criterion for first issue

The first of a series of warnings is issued as soon as gale, storm-force or hurricane-force winds are expected in the area of responsibility within 24 hours.

c) Frequency of subsequent issues

Subsequent wind warnings are issued every six hours unless a major amendment is necessary at an intermediate time.

d) Format and content of warnings

i. Part A: Name, and Numbering of Warning.
ii. Part B: Type of warning (GALE, STORM-FORCE, HURRICANE-FORCE WIND WARNING), date and time of product issuance (UTC).
iii. Part C: Synoptic context and time
Type of disturbance (TROPICAL CYCLONE) and any name, Central pressure (hPa), Location of disturbance (latitude and longitude), Location confidence estimate (GOOD/FAIR/POOR), Forecast direction (in compass points) and speed of movement in knots of the tropical cyclone, Intensity (maximum 10-minute average winds in knots)
iv. Part D: Extent of affected area
Wind speed (knots) and sea and swell conditions in various sections of affected area.
v. Part E: Expected location at 06, 12, 18 and 24 hours hence
Next issue time.

3.2.6.4 Tropical Cyclone Bulletin / Bulletin d'information cyclone

a) **Purpose**

Tropical cyclone bulletins are intended to:

- inform a community (of New Caledonia or Wallis and Futuna) to the developing threat of a tropical cyclone, or
- provide warnings of tropical cyclones

Tropical Cyclone Bulletins are always accompanied by a satellite image of the tropical cyclone and a track map (see below).
They are released on:

- https://www.meteo.nc/nouvelle-caledonie/cyclone/phenomenes-en-cours for a tropical cyclone in New Caledonia warning area
- https://www.meteo.nc/wallis-et-futuna/cyclone/phenomenes-en-cours for a tropical cyclone in Wallis-et-Futuna warning area

b) Criteria for first issue

A Tropical Cyclone Bulletin is issued as soon as:

- tropical cyclone or developing tropical depression is apparent or expected within 12 hours in warning areas of New Caledonia or Wallis and Futuna
- New Caledonia or Wallis and Futuna is threatened by storm force winds within 72 hours
- Cyclonic alert is activated in New Caledonia or Wallis-et-Futuna.

c) Time of first issue

As far as possible the first tropical cyclone bulletin is issued to reach the public in time to allow several hours of daylight in which action will be taken such as to dock boats safely and to take other protective measures against severe conditions.

d) Frequency of issue

Frequency of issue vary with the threat:

- if there is no threat within 72 hours for New Caledonia or Wallis and Futuna : Tropical cyclone bulletins are issued twice a day at 09 UTC and 21 UTC ;
- if New Caledonia or Wallis and Futuna is threatened within 72 hours, Tropical cyclone bulletins are issued 4 times a day at 03, 09, 15 and 21 UTC ;
- if cyclonic alert number 2 is activated in New Caledonia or Wallis-et-Futuna, Tropical cyclone bulletins are issued at 3 hourly intervals.

e) Format

Tropical cyclone bulletins are written only in French, they are self-contained. As far as possible they are expressed in non-technical language.

i. Disturbance type and name of system;
ii. Sequential message number;
iii. Issue time;

iv. Next issue time;
v. Level of activated cyclonic alert
vi. Level of forecasted cyclonic alert
vii. Analysis time and location of disturbance with reference to well-known landmarks and bearing, expressed in compass points and distances in kilometres;
viii. Intensity expressed in terms of wind force and estimated central pressure and movement at analysis time;
ix. Expected movement, intensity and damages for the next 24 hours. As far as possible, areas likely to experience hurricane, storm or gale force winds, heavy rainfall, flooding, swell and waves in coastal areas and storm surge ;
x. Only if alert is activated: behaviour advice.

3.2.6.5 Tropical cyclone track map / Carte de trajectoire cyclone

a) **Purpose**

Tropical cyclone track maps are intended to provide in a visual way, analysis details and forecast positions, uncertainties and intensity forecasts at 6-hour intervals to + 72 hours for tropical cyclones and some developing tropical depressions in warning areas of New Caledonia or Wallis and Futuna.
They are released on:

- https://www.meteo.nc/nouvelle-caledonie/cyclone/phenomenes-en-cours for a tropical cyclone in New Caledonia warning area
- https://www.meteo.nc/wallis-et-futuna/cyclone/phenomenes-en-cours for a tropical cyclone in Wallis-et-Futuna warning area

b) Criteria for first issue

Tropical cyclone track map is issued as soon as:

- a tropical cyclone with at least gale force winds is or is forecast to develop within 12 hours in a warning area;
- New Caledonia or Wallis and Futuna is threatened by storm force winds within 72 hours,
- Cyclone alert is activated in New Caledonia or Wallis-et-Futuna.

c) Time of first issue

As far as possible, the first tropical cyclone track map is issued to reach the public in time to allow several hours of daylight in which action will be taken such as to dock boats safely and to take other protective measures against severe conditions.

d) Frequency of issue

Frequency of issue vary with the threat:

- if there is no threat within 72 hours for New Caledonia or Wallis and Futuna : Tropical cyclone track maps are issued twice a day at 09 UTC and 21 UTC ;
- if New Caledonia or Wallis and Futuna is threatened within 72 hours, Tropical cyclone threat maps are issued 4 times a day at 03, 09, 15 and 21 UTC ;

e) Format

Tropical cyclone track map legend is indicated on the file.

3.2.6.6 Tropical Cyclone Activity Bulletin / Bulletin d'activité cyclonique

a) **Purpose**

Tropical cyclone activity bulletins are intended to give advance information of existing tropical cyclones and the potential of a tropical cyclone forming out of an existing tropical disturbance as well as the genesis of a totally new cyclone inside the area Equator to 35°S, 140°E to 165°W in the next 7 days.
They are released on:

- https://www.meteo.nc/nouvelle-caledonie/cyclone/bulletin for a tropical cyclone threatening New Caledonia
- https://www.meteo.nc/wallis-et-futuna/cyclone/bulletin for a tropical cyclone threatening Wallis and Futuna

b) General description

Tropical Cyclone Activity Bulletins include a map containing:

- the suspect areas of potential development with probability of genesis in 3 colours;
- active tropical cyclones.

c) Time and frequency of issue

Tropical Cyclone Activity Bulletins are issued daily at 0100 UTC. Bulletins may also be issued when a tropical cyclone is named by RMSC Nadi or the TCWC Melbourne .

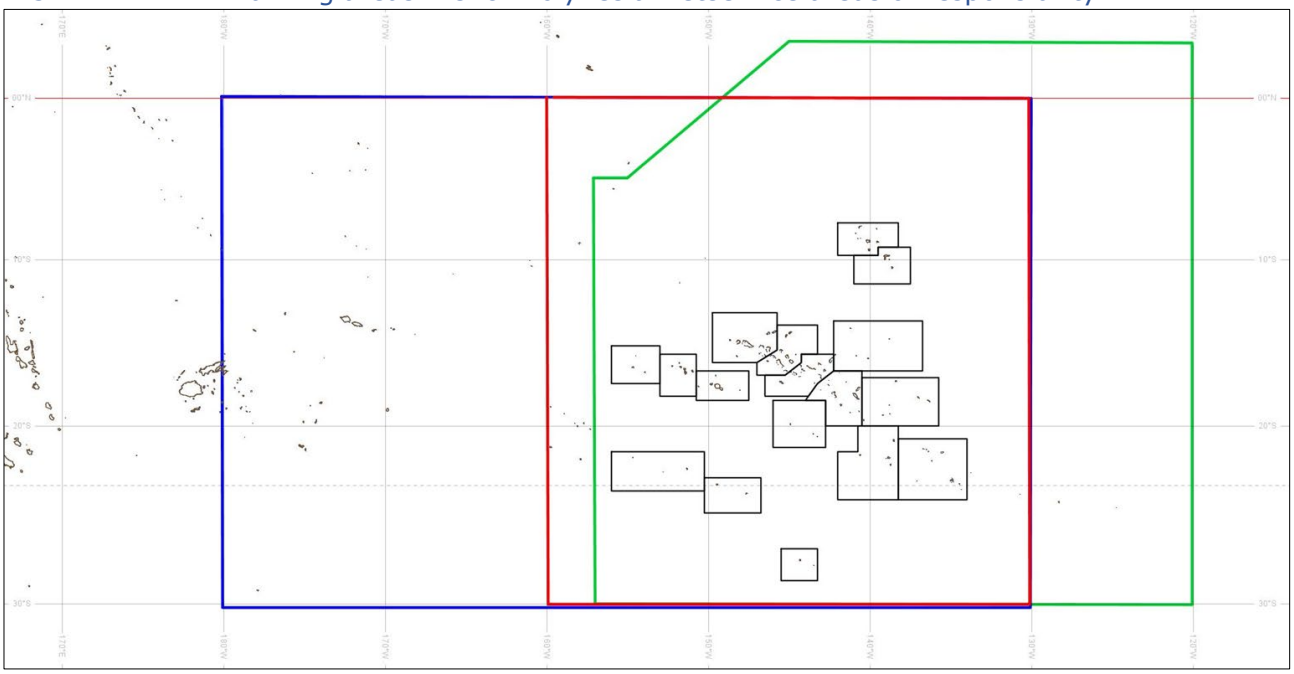
d) Contents

Tropical Cyclone Activity Bulletins contain the following essential information:

i. Bulletin header;
ii. Date and time of issue (UTC);
iii. Map;
iv. Active tropical cyclones with a link to the website of official information.
v. Tropical activity forecast for the next 7 days.
vi. Description of threat to New Caledonia or Wallis and Futuna if required
vii. Next issue time.

3.2.7 French Polynesia Meteorological Service, Tahiti

3.2.7.1 Warning areas French Polynesia Metservice areas of responsibility



- French Polynesia tropical cyclone **WATCH** area is delimited by equator-30S and 180 W-130W (in blue) = Zone of TC expertise in French Polynesia
- French Polynesia tropical cyclone **WARNING** area is delimited by equator-30S and 160 W-130W (in red)
- French Polynesia **MHEWS** and **Cyclonic Alert Zone** separated in 17 warning areas (black polygons)
- Tahiti Oceanic Flight Information Region (FIR, in green)

3.2.7.2 Tropical Cyclone Bulletin / Avis de phénomène cyclonique

a) Purpose

Tropical cyclone bulletins are intended to provide:

- Information on current cyclones in French Polynesia.
- Warnings of tropical cyclones
- Tropical cyclone bulletins are always accompanied by a track map (see next part).
- They are released on https://meteo.pf/fr

b) Criteria for first issue

Tropical cyclone bulletin is issued as soon as:

- French Polynesia is threatened by tropical cyclone or tropical storm within 72 hours (Average wind speed ≥ 100 km/h)
- cyclonic alert is activated in French Polynesia (by State authorities: High Commissioner)

c) Time of first issue

As far as possible, the first tropical cyclone bulletin is issued to reach the public in time to allow several hours of daylight in which action will be taken such as to dock boats safely and to take other protective measures against severe conditions.

d) Frequency of issue

Frequency of issue varies with the threat:

- If French Polynesia is threatened within 72 hours, Tropical cyclone bulletins are issued 2 times a day approximately every 12 hours.
- If French Polynesia is threatened within 48 hours, Tropical cyclone bulletins are issued 4 times a day approximately every 6 hours.
- If French Polynesia is threatened within 18 hours, Tropical cyclone bulletins are issued approximately every 6 hours and if it is possible every 3 hours.

e) Contents

Tropical Cyclone Bulletins are written only in French and as far as possible are expressed in non-technical language.

i. Disturbance type and name of system;
ii. Sequential message number;
iii. Issue time;
iv. Next issue time;
v. Analysis time and location of disturbance with reference to well-known landmarks, with bearing expressed in compass points and distances in kilometres;
vi. Intensity expressed in terms of wind force, estimated central pressure and movement at analysis time;
vii. Expected movement, intensity and damages for the next 24 hours. As far as possible, areas likely to experience hurricane, storm or gale force winds, heavy rainfall, flooding, swell and waves in coastal areas and storm surge;
viii. Track map.
ix. Level of activated cyclonic alert.

3.2.7.3 Ocean gale, storm-force and hurricane-force wind warnings / Bulletin météorologique spécial (BMS)

These are issued in accordance with the standard international service standards described in the WMO Manual on Marine Meteorological Services (WMO No.558), and WMO template for marine warnings (see Attachment 3A).

a) Purpose

Wind warnings are issued as soon as gale-force winds are forecast in the French Polynesia area of responsibility within 24 hours and broadcast on GTS, on https://meteo.pf/fr and on VHF 65.

b) Criterion for first issue

The first warning is issued as soon as winds of at least gale force are expected in the area of responsibility within 24 hours.

c) Frequency and time of subsequent issues

Subsequent issues are 0100 and 1500 UTC unless a major amendment is necessary at an intermediate time.

d) Format and content of warnings

These bulletins are written only in French.

i. **Part A**: Type of warning (GALE, STORM-FORCE, HURRICANE-FORCE WIND WARNING.
ii. **Part B**: Name, number of Warning, date and time of product issuance (UTC)
iii. **Part C**: Synoptic context and time.
Type of disturbance (TROPICAL CYCLONE) and any name, Central pressure (hPa), Location of disturbance (latitude and longitude), Location confidence estimate (GOOD/FAIR/POOR), Forecast direction (in compass points) and speed of movement in knots of the tropical cyclone, Intensity (maximum 10-minute average winds in knots)
iv. **Part D**: Extent of affected area.

Wind speed (knots) in various sections of affected area, Sea and Swell conditions in the area affected

v. **Part E**: Expected location at 24 hours hence with direction and speed of movement of system in knots (kt)

3.2.7.4 SIGMET Information for aviation (FIR)

These are issued in accordance with section 2.1.3
The content and order of elements in a SIGMET message for tropical cyclone shall be in accordance with WMO Technical Regulations, Volume II. The data type designator to be included in the WMO abbreviated header of such messages shall be T_1T_2 = WC (WMO-No. 386, Manual on GTS refers).

3.2.7.5 Seasonal forecast bulletin/ Bulletin hebdomadaire de prévisions saisonnières

a) **Purpose**

Seasonal forecast bulletins are intended to give information on climatic conditions in the South Pacific and the potential for a tropical cyclone inside the area: Equator to 30°S, 180°E to 165°W in the next 3 weeks. They are released on https://meteo.pf/fr

b) General description

Seasonal forecast bulletins are written only in French. They include:

- Description of climatic conditions in the South Pacific, especially ENSO conditions and Southern Oscillation Index (SOI) with a link to the website of official information;
- Trend of tropical activity for the next 3 weeks days (including SPCZ and ITCZ forecast activity in French Polynesia.

c) Time and frequency of issue

Seasonal forecast bulletins are issued weekly on Tuesday during the tropical cyclone season (period from 1 November to 30 April)

d) Contents

Seasonal forecast bulletins contain the following essential information:

i. Bulletin header;
ii. Date and time of issue;
iii. Map;
iv. Active tropical cyclones with a link to the website of official information;
v. Tropical activity forecast for the next 3 weeks;
vi. Next issue time.

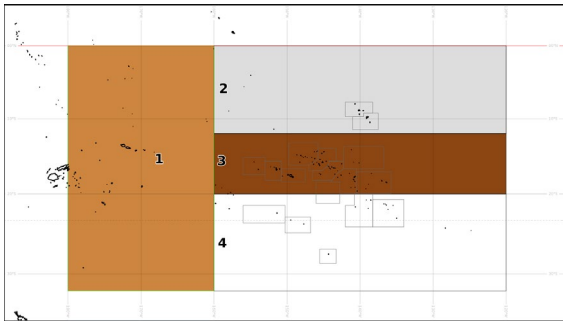
3.2.7.6 TC genesis forecast bulletin/ Bulletin hebdomadaire d'activité cyclonique

a) Purpose

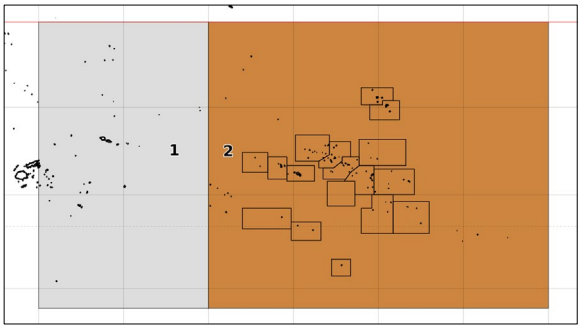
Weekly forecast bulletins are intended to give information on climatic conditions in the South Pacific and the potential for a tropical cyclone inside the area: Equator to 30°S, 180°E to 130°W within the weeks W+2 and W+3.

b) General description

The area is separated in 4 zones at term week+2 and 2 zones at term week+3.



term week+2



term week+3

Probability of cyclogenesis for each zone:

Probability		Colour	Code couleur (RVB)
Not Expected			FFFFFF
Poor	≤ 30 %		DDDDDD
Fair	> 30 % - 70 %		CD853F
Good	> 70 %		8B4513

Two versions for this bulletins:

- Reduced Version for local authorities, not for general public by that time but expected to be. The two maps and a text without technical term describing the general situation and the probability.
- Completed Internal Version. The two maps and a technical text describing the input to issue the probability, e,g planetary waves (MJO, Kelvin ...), Synoptic situation and Multi-model approach.

c) Time and frequency of issue

Weekly on Tuesday during the tropical cyclone season (period from 1 November to 30 April).

ATTACHMENT 3A: Format and content of ocean waters gale, storm-force and hurricane-force wind warnings issued to shipping by Tropical Cyclone Warning Centres in the region

3.A.1 Format and Content

The format and content of warnings issued for the WWMIWS, as outlined below, has been derived from guidance provided in the Manual on Marine Meteorological Services (WMO No.558). The minor variations that occur in corresponding warnings issued by the other TCWCs in the Region is indicated in section 3.A.2. Any Tropical Cyclone-related wind warning issued for the WWMIWS should include the following content (excluding any relevant system metadata requirements):

i. Header label for marine radio broadcast purposes ("SECURITE");
ii. Type of warning (GALE, STORM-FORCE, HURRICANE-FORCE WIND WARNING);
iii. Numbering of Warnings (optional);
iv. Office issuing warning (NADI);
v. Date and time of product issuance (UTC)
vi. Type of disturbance (TROPICAL CYCLONE) and any name;
vii. Central pressure (hPa);
viii. Location of disturbance (latitude and longitude);
ix. Location confidence estimate (GOOD/FAIR/POOR);
x. Forecast direction (in compass points) and speed of movement in knots of the tropical cyclone;
xi. Intensity (maximum 10-minute average winds in knots);
xii. Expected location at 12 and 24 hours hence;
xiii. Extent of affected area;
xiv. Wind speed (knots) in various sections of affected area;
xv. Sea and Swell conditions in the area affected;
xvi. Further intensity changes if any;
xvii. Request to shipping for three hourly weather and Radar rain reports;
xviii. Office issuing the next warning if handing over responsibility;
xix. Cancellation;
xx. Indication of when next warning will be issued.

3.A.2 Regional Variations

The following regional variations to the above format occur:

- In (vi) above Australia and Port Moresby:

(i) Use the term SEVERE TROPICAL CYCLONE when wind speeds average 64 knots or more;
(ii) Indicate estimated central pressure (hPa).

Australia includes 12 and 24 hour forecast positions in (xvi) above.

ATTACHMENT 3B: Forecast Information provided by Meteorological Centres outside the region[12]

RSMC Honolulu - Hurricane Centre

3.B.1. Tropical Cyclone Warnings

These sequentially numbered warnings for gale, storm and hurricane force winds are issued 6 hourly at 0300, 0900, 1500 and 2100 UTC for the area covered by the Central North Pacific from 140W - 180 degrees longitude.

3.B.2. Southern Hemisphere Tropical Cyclone Summary

These subjective Dvorak tropical cyclone fixes are issued for the area covered by the Operational Plan that is between 120 West and 160 East, north of 25 South. They are issued as needed when conditions of a tropical cyclone are classifiable under the Dvorak Technique. Each summary is an analysis of a tropical disturbance or cyclone and contains its location, intensity and trend. The following are sections included in the South Pacific Tropical Cyclone Summary:

(a) The tropical cyclone name, or description of a tropical disturbance;
(b) Satellite image date/time used for the analysis followed by a Z;
(c) Latitude followed by an S;
(d) Longitude followed by an E or W;
(e) Satellite platform, such as Himawari or GOES;
(f) Final T-number/Current Intensity Number/Trend and Amount/Time Frame Used for Trend;
(g) Satellite image type, such as IR or Visible;
(h) Any relevant remarks, such as Dvorak classification method;
(i) Tab right any additional positions.

Example:

TXPS41 PHFO 231740
TCSSP1

SOUTH PACIFIC TROPICAL CYCLONE SUMMARY - FIXES
NWS CENTRAL PACIFIC HURRICANE CENTER HONOLULU HI
1740 UTC SAT APR 23 2016

A. TROPICAL CYCLONE AMOS

B. 23/1652Z

C. 13.8S

D. 170.3W

E. HIMAWARI/GOES-15

F. T5.0/5.0/S0.0/24 HRS

G. IR/EIR/ANIMATION

H. REMARKS...LLCC EMBEDDED IN COLD MEDIUM GREY...COLDER THAN WHITE...YIELDS DT OF 5.0. MET IS 5.0 AND PT IS 4.5. FT BASED ON DT.

I. ADDL POSITIONS
NONE

[12] It should be noted that the definition of some terms used in this attachment may differ from those of the South Pacific and South-East Indian Ocean regions

ATTACHMENT 3C: Tropical Cyclone Advisory Headings

NB: Existing/assigned WMO headers in ***Volume C1- Catalogue of Meteorological Bulletins*** (updated on a weekly basis) at http://wis.wmo.int/operational-info/VolumeC1/VolC1.txt

Centre	*WMO Abbreviated Headings*	*Type of Bulletin*
TCWC MELBOURNE		
	AXAU21 ABRF	TROPICAL CYCLONE BULLETIN
	WOAU01 ABRF	GALE WARNING (MARINE)
	WOAU02 ABRF	GALE WARNING (MARINE)
	WHAU01 ABRF	SEVERE TROPICAL CYCLONE WARNING
	WHAU02 ABRF	SEVERE TROPICAL CYCLONE WARNING
	WTAU01 ABRF	TROPICAL CYCLONE WARNING
	WTAU02 ABRF	TROPICAL CYCLONE WARNING
	WWSO21 ABRF	SATELLITE ANALYSIS BULLETIN
	WWPS22 ABRF	TROPICAL DISTURBANCE ADVISORY BULLETIN for SOLOMON ISLANDS
	AXAU01 ADRM	TROPICAL CYCLONE BULLETIN
	AXAU40 ADRM	TROPICAL ANALYSIS BULLETIN for BRACKNELL
	WOAU03 ADRM	GALE WARNING (MARINE)
	WOAU04 ADRM	GALE WARNING (MARINE)
	WTAU03 ADRM	TROPICAL CYCLONE WARNING
	WTAU04 ADRM	TROPICAL CYCLONE WARNING
	WTAU10 ADRM	TROPICAL CYCLONE WARNING
	WTAU11 ADRM	TROPICAL CYCLONE WARNING
	WTAU12 ADRM	TROPICAL CYCLONE WARNING
	WTAU13 ADRM	TROPICAL CYCLONE WARNING
	FKAU ADRM	TROPICAL CYCLONE AVIATION ADVISORIES
	WCAU ADRM	SIGMET
	AXAU01 APRF	TROPICAL CYCLONE BULLETIN
	AXAU02 APRF	TROPICAL CYCLONE BULLETIN
	AXAU03 APRF	TROPICAL CYCLONE BULLETIN
	TPIO24 APRF	TROPICAL CYCLONE ADVISORY BULLETIN FOR RA I
	WOAU05 APRF	GALE WARNING (MARINE)
	WOAU06 APRF	GALE WARNING (MARINE)
	WTAU05 APRF	TROPICAL CYCLONE WARNING
	WTAU06 APRF	TROPICAL CYCLONE WARNING
	WTAU07 APRF	TROPICAL CYCLONE WARNING
TCWC WELLINGTON		
	WWNZ40 NZKL	GALE / STORM WARNING (NON-TC)
	WTNZ41 NZKL	TROPICAL CYCLONE GALE / STORM WARNING
	WHNZ41 NZKL	TROPICAL CYCLONE HURRICANE WARNING
	WCPS21 NZKL	SIGMET FOR TROPICAL CYCLONE IN NZZO AREA
	FQPS43 NZKL	HIGH SEAS FORECAST FOR SUBTROPIC AREA
	FQPS45 NZKL	HIGH SEAS FORECAST FOR PACIFIC AREA
TCWC PORT MORESBY		
	WCNG01 AYPY	SIGMET
	WHNG01 AYPY	SEVERE TROPICAL CYCLONE WARNING
	WONG01 AYPY	GALE WARNING (MARINE)
	WONG02 AYPY	GALE WARNING (MARINE)
	WONG20 AYPY	GALE WARNING (MARINE)
	WONG21 AYPA	GALE WARNING (MARINE)
	WSNG21 AYPY	SIGMET
	WSNG31 AYPY	SIGMET
	WTNG01 AYPY	TROPICAL CYCLONE WARNING
	WTNG02 AYPY	TROPICAL CYCLONE WARNING

Centre	WMO Abbreviated Headings	Type of Bulletin
RSMC NADI		
	NWPS01 NFFN	TROPICAL CYCLONE NAMING BULLETIN
	WOPS01 NFFN	NIL WARNING or NON-TROPICAL CYCLONE WARNING
	WTPS01 NFFN	MARINE GALE/STORM WARNING
	WHPS01 NFFN	MARINE HURRICANE WARNING
	WWFJ40 NFFN	SPECIAL WEATHER BULLETIN for FIJI
	WWKU40 NFFN	SPECIAL WEATHER BULLETIN for NORTHERN COOK ISLANDS
	WWKU41 NFFN	SPECIAL WEATHER BULLETIN for SOUTHERN COOK ISLANDS
	WWKB40 NFFN	SPECIAL WEATHER BULLETIN for KIRIBATI
	WWNE40 NFFN	SPECIAL WEATHER BULLETIN for NIUE
	WWTK40 NFFN	SPECIAL WEATHER BULLETIN for TOKELAU
	WWTV40 NFFN	SPECIAL WEATHER BULLETIN for TUVALU
	WCFJ01 NFFN	SIGMET
	WWPS21 NFFN	TROPICAL DISTURBANCE SUMMARY
	WTPS11 NFFN	TROPICAL DISTURBANCE ADVISORY
	FKPS01-03 NFFN	TROPICAL CYCLONE AVIATION ADVISORIES
TCWC Jakarta		
	WTID01-02 WIIX	OCEAN GALE/STORM WARNING
	WCID01-02 WIIX	SIGMET
	FPID31 WIIX	TROPICAL CYCLONE BULLETIN
SAMOA		
	WWZM40 NSAP	SPECIAL WEATHER BULLETIN (based on ADVISORY from FIJI)
NEW CALEDONIA		
	WWNC01 NWBB	SPECIAL MARINE BULLETIN GALE WARNING IN FRENCH
	WWNC02 NWBB	SPECIAL MARINE BULLETIN GALE WARNING IN ENGLISH
	WTNC01 NWBB	SPECIAL MARINE BULLETIN STORM WARNING IN FRENCH
	WTNC02 NWBB	SPECIAL MARINE BULLETIN STORM WARNING IN ENGLISH
	WHNC01 NWBB	SPECIAL MARINE BULLETIN HURRICANE WARNING IN FRENCH
	WHNC02 NWBB	SPECIAL MARINE BULLETIN HURRICANE WARNING IN ENGLISH
	WWWF01 NWBB	Special wind advisory for coastal area and islands of Wallis-et-Futuna
	WTNC18 NWBB	Tropical cyclone advisory
	TDNC98 NWBB	Tropical cyclone activity bulletin for New Caledonia only disseminated if an area is plotted
	WONC11 NWBB	Tropical cyclone bulletin for New Caledonia area
	TDWF98 NWBB	Tropical cyclone activity bulletin for Wallis-et-Futuna only disseminated if an area is plotted
	WOWF11 NWBB	Tropical cyclone bulletin for Wallis-et-Futuna area
TONGA		
	WWTTO40 NFTF	TROPICAL CYCLONE ADVISORY
TAHITI		
	WCPF20 NTAA	SIGMET DE CYCLONE TROPICAL
	WOPF10 NTAA	AVIS DE COUP DE VENT: Gale Warning IN FRENCH
	WOPF11 NTAA	AVIS DE TEMPETE: Storm warning IN FRENCH
	WHPF01 NTAA	AVIS DE CYCLONE: Hurricane warning IN FRENCH
RSMC/WFO HONOLULU		
	FZPS40 PHFO	HIGH SEAS FORECAST SOUTH PACIFIC
	WHPS50 PHFO	AMENDED HIGH SEAS FORECAST SOUTH PACIFIC
	TXPS40 PHFO	TROPICAL CYCLONE FIXES SOUTH PACIFIC aka SOUTHERN HEMISPHERE TROPICAL CYCLONE SUMMARY
AMERICAN SAMOA		
	WTZS81 NSTU	HURRICANE LOCAL STATEMENT
	WWZS80 NSTU	SPECIAL WEATHER STATEMENT
	WWZS70 NSTU	NON-PRECIPITABLE PRODUCTS, INCLUDING WIND ADVISORY, HIGH WIND WARNING AND HIGH WIND WATCH
	FZZS70 NSTU	MARINE WIND STATEMENT

PRODUCTS ISSUED BY JTWC FOR USA MILITARY AND USA NATIONAL INTERESTS IN THE SOUTH-EAST INDIAN OCEAN

WMO Abbreviated Headings	*Type of Bulletin*
ABIO10 PGTW	SIGNIFICANT TROPICAL WEATHER ADVISORY FOR THE INDIAN OCEAN (NORTH AND SOUTH OF THE EQUATOR AND WEST OF 135 E)
WTXS21-25 PGTW	TROPICAL CYCLONE FORMATION ALERT FOR THE SOUTH INDIAN OCEAN (WEST OF 135 E TO THE COAST OF AFRICA)
WTXS31-35 PGTW	SOUTH INDIAN OCEAN TROPICAL CYCLONE WARNINGS (WEST OF 135 E TO THE COAST OF AFRICA)
TPXS10 XXXX	SOUTH INDIAN OCEAN TROPICAL CYCLONE POSITION REPORTS BASED ON METEOROLOGICAL SATELLITE DATA.
XXXX =	PGTW = 17TH OPERATIONAL WEATHER SQUADRON (OWS), SATELLITE OPERATIONS (CO-LOCATED WITH THE JTWC). FJDG = U. S. NAVY DIEGO GARCIA SITE.

PRODUCTS ISSUED BY JTWC FOR USA MILITARY AND USA NATIONAL INTERESTS IN THE SOUTH PACIFIC

WMO Abbreviated Headings	*Type of Bulletin*
ABPW10 PGTW	SIGNIFICANT TROPICAL WEATHER ADVISORY FOR THE WESTERN PACIFIC OCEAN BETWEEN 135 E AND 180 E.
WTXS21-25 PHNC	TROPICAL CYCLONE FORMATION ALERT FOR THE SOUTHEAST PACIFIC (EAST OF 180)
WTPS31-35 PHNC	TROPICAL CYCLONE WARNINGS FOR THE SOUTHEAST PACIFIC (EAST OF 180)
WTPS21-25 PGTW	TROPICAL CYCLONE FORMATION ALERT FOR THE SOUTHWEST PACIFIC (WEST OF 180 AND EAST OF 135E)
WTPS31-35 PGTW	TROPICAL CYCLONE WARNING FOR THE SOUTHWEST PACIFIC (WEST OF 180 AND EAST OF 135E)
TPPS10 XXXX	SOUTH PACIFIC OCEAN TROPICAL CYCLONE POSITION REPORTS BASED ON METEOROLOGICAL SATELLITE DATA
XXXX =	PGTW or KGWC

NOAA/NESDIS PRODUCTS FOR THE SOUTH PACIFIC AND SOUTHEAST INDIAN OCEAN

WMO Abbreviated Headings	*Type of Bulletin*
TCIO10 KWBC	INDIAN OCEAN TROPICAL CYCLONE POSITION REPORT BASED ON METEOROLOGICAL SATELLITE DATA ISSUED BY THE US NESDIS, SUITLAND, MD
WWPS10 KWBC	SOUTH PACIFIC TROPICAL CYCLONE POSITION REPORT BASED ON METEOROLOGICAL SATELLITE DATA ISSUED BY THE US NESDIS, SUITLAND, MD.

Annex: Examples of products

RSMC Nadi

Examples of Tropical Cyclone Alerts

Example 1.

"**SPECIAL WEATHER BULLETIN** NUMBER ONE FOR THE SOUTHERN COOKS ON TROPICAL CYCLONE PAM ISSUED FROM RSMC NADI AT 1700 UTC ON 6 DECEMBER
TROPICAL CYCLONE ALERT
A TROPICAL CYCLONE ALERT IS NOW IN FORCE FOR SOUTHERN COOKS.
TROPICAL CYCLONE PAM (995hPa) WAS LOCATED NEAR 11.9 DEGREES SOUTH 162.6 DEGREES WEST OR ABOUT 360 NAUTICAL MILES NORTH OF PALMERSTON ISLAND AT 061500 UTC. PAM IS INTENSIFYING AND CURRENTLY SLOW-MOVING BUT IS EXPECTED TO MOVE SOUTHWARDS LATER.
ON THIS FORECAST TRACK, THE CYCLONE MAY BRING GALE FORCE WINDS OVER PALMERSTON ISLAND AND OTHER NORTHERN PARTS OF THE SOUTHERN COOKS IN THE NEXT 24 TO 48 HOURS.
FOR PALMERSTON ISLAND: SOUTHEAST WINDS 25 KNOTS WITH GUSTS TO 35 KNOTS. CLOUDY WITH OCCASIONAL RAIN DEVELOPING. SEAS ROUGH WITH A MODERATE TO HEAVY SWELL.
FOR THE REMAINING ISLANDS OF THE SOUTHERN COOKS: STRONG AND GUSTY SOUTHEAST WINDS. CLOUDY, WITH SHOWERS BECOMING MORE FREQUENT LATER TODAY. SEAS ROUGH WITH A MODERATE SWELL.
THE NEXT SPECIAL WEATHER BULLETIN FOR THE SOUTHERN COOKS WILL BE ISSUED AROUND 062300 UTC OR EARLIER.
PLEASE ACKNOWLEDGE RECEIPT OF THIS BULLETIN."

Example 2.

"**SPECIAL WEATHER BULLETIN** NUMBER THREE FOR NIUE ISSUED FROM RSMC NADI AT 0200 UTC ON 6 JANUARY.
TROPICAL CYCLONE ALERT
A TROPICAL CYCLONE ALERT IS IN FORCE FOR NIUE.
THE WEATHER IS DISTURBED IN THE AREA BETWEEN NORTHERN PARTS OF TONGA AND NIUE AND THERE IS A CHANCE THAT A TROPICAL CYCLONE MAY DEVELOP CLOSE TO NIUE DURING THE NEXT 24 TO 36 HOURS. IF IT DOES SO, GALE FORCE WINDS MAY BE EXPERIENCED OVER NIUE LATE TOMORROW.
FORECAST FOR NIUE UNTIL 071200 UTC:
EXPECT EASTERLY WINDS 20 TO 25 KNOTS POSSIBLY RISING TO 35 KNOTS LATE TOMMORROW. RAIN AT TIMES. SEA POSSIBLY BECOMING VERY ROUGH, WITH A MODERATE TO HEAVY EASTERLY SWELL.
THE NEXT BULLETIN WILL BE ISSUED AT 060800 UTC."

Example 3.

"**SPECIAL WEATHER BULLETIN** NUMBER SEVEN FOR TUVALU ON TROPICAL CYCLONE PAM ISSUED FROM RSMC NADI AT 1600 UTC ON 22 DECEMBER UTC
A TROPICAL CYCLONE ALERT PREVIOUSLY IN FORCE FOR TUVALU IS NOW CANCELLED.
TROPICAL CYCLONE PAM WAS LOCATED ABOUT 250 NAUTICAL MILES SOUTHEAST OF NIULAKITA AT 061500 UTC AND IS NOW MOVING STEADILY SOUTHEASTWARDS. AS A RESULT, GALE FORCE WINDS ARE NO LONGER EXPECTED OVER TUVALU.
FORECAST FOR TUVALU UNTIL 231200 UTC:
WESTERLY WINDS 20 TO 25 KNOTS AND SQUALLY IN A FEW HEAVY SHOWERS AND THUNDERSTORMS. ROUGH SEAS WITH A MODERATE NORTHWEST SWELL.
THIS WILL BE THE FINAL SPECIAL WEATHER BULLETIN FOR TUVALU UNLESS THE SITUATION CHANGES. THE NEXT BULLETIN WILL BE THE ROUTINE ISSUE AT 230230 UTC."

Examples of Tropical Disturbance Advisory

Example 1.

"TROPICAL DISTURBANCE ADVISORY NO A2 ISSUED BY RSMC NADI AT 170750 UTC DECEMBER 1986.
SHALLOW TROPICAL DEPRESSION CENTRE POORLY DEFINED, ESTIMATED WITHIN 100 NAUTICAL MILES OF 12S 165W AT 170600 UTC. WINDS UP TO 25 KNOTS, STRONGEST IN THE SOUTHERN SEMICIRCLE. ANALYSIS BASED ON POOR SATELLITE PICTURES AND PERIPHERAL SURFACE OBSERVATIONS.
A GRADUAL WESTSOUTHWEST DRIFT EXPECTED WITH MODERATELY RAPID DEEPENING IN THE NEXT 24 TO 36 HOURS. WEAK VERTICAL WIND SHEAR ABOVE SYSTEM AND A REASONABLE SOUTHEASTERLY EQUATORWARD OUTFLOW SUGGESTS STEADY DEEPENING. TREND OF PAST MOVEMENT NOT WELL KNOWN DUE TO LACK OF RELIABLE PAST ANALYSIS AND DEFINITION. SYSTEM EXPECTED TO BE STEERED MAINLY BY THE LOWER TROPOSPHERIC EASTERLIES NORTH OF THE SUBTROPICAL RIDGE. THE SYSTEM POSES AN IMMEDIATE THREAT TO AMERICAN SAMOA AND INDEPENDENT SAMOA AND LATER TO NORTHERN TONGA AND WALLIS/FUTUNA ISLANDS.
THE NEXT ADVISORY ON THIS DISTURBANCE WILL BE ISSUED AT 171945 UTC.

Example 2.

TROPICAL DISTURBANCE ADVISORY NO B3 ISSUED BY RSMC NADI AT 290745 UTC JANUARY 1986.
HURRICANE ZENA CENTRED WITHIN 60 NAUTICAL MILES OF 11S 162E AT 290600 UTC. MAXIMUM SUSTAINED WIND SPEED ABOUT 65 KNOTS. ANALYSIS BASED ON PERIPHERAL SURFACE OBSERVATIONS AND INTENSITY ESTIMATED USING DVORAK TECHNIQUE. CONFIDENCE IN POSITION OF CENTRE FAIR BASED ON CLEAR EYE VISIBLE IN SATPIX. SYSTEM EXPECTED TO MOVE SOUTHEAST AT 12 KNOTS AT FIRST BUT ACCELERATING TEMPORARILY LATER TO ABOUT 17 KNOTS AFTER 12 HOURS. APPEARS TO BE STEERED LARGELY BY NORTHWESTERLY STEERING FIELD ABOVE SYSTEM. VERTICAL SHEAR ABOVE SYSTEM EXPECTED TO INCREASE SLOWLY AND FURTHER INTENSIFICATION UNLIKELY.
THE NEXT ADVISORY ON THIS DISTURBANCE WILL BE ISSUED AT 291945 UTC.

Example 3.

TROPICAL DISTURBANCE ADVISORY NO C2 ISSUED BY RSMC NADI AT 030745 UTC FEBRUARY 1986.
TROPICAL CYCLONE AMI HAS DEVELOPED NEAR 10S 178E. MAXIMUM SUSTAINED WINDS ESTIMATED AT 40 KNOTS AT 030600Z. CIRCULATION WELL DEFINED BASED ON GOOD SURFACE DATA AND HIGH RESOLUTION SATELLITE DATA.
POSITION ACCURATE WITHIN 60 NAUTICAL MILES.
THE LOW LATITUDE LOCATION OF THE SYSTEM, SMALL VERTICAL SHEAR AND STRONG UPPER TROPOSPHERIC OUTFLOW SUGGEST GOOD PROSPECTS FOR EXPLOSIVE DEVELOPMENT. MAXIMUM SUSTAINED WINDS EXPECTED TO INCREASE TO 65 KNOTS AFTER 12 HOURS. FUTURE MOVEMENT BASED MAINLY ON EXTRAPOLATION AND CLIMATOLOGY EXPECTED TO BE 8 KNOTS WESTWARDS TURNING SOUTHWESTWARDS AFTER 24 HOURS.
THE NEXT ADVISORY ON THIS DISTURBANCE WILL BE ISSUED AT 031945 UTC.

Example of Tropical Cyclone Advisory for aviation

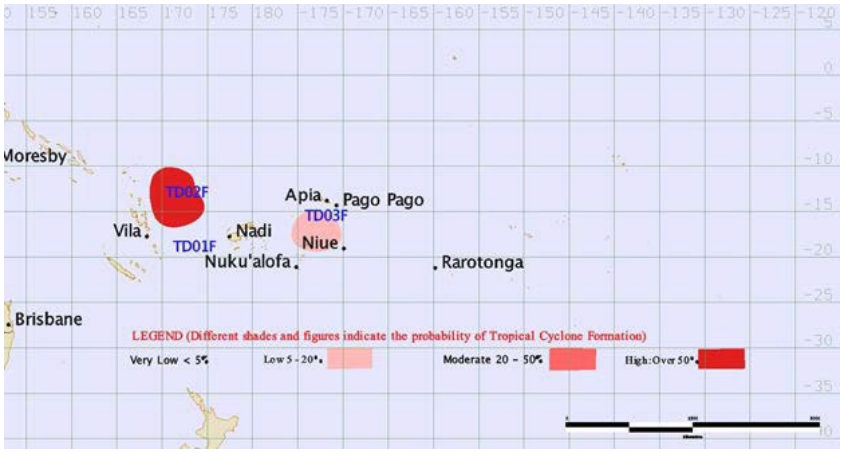
TC ADVISORY

FKPS02 NFFN 190638

TC ADVISORY
DTG: 20201219/0600Z
TCAC: NFFN
TC: YASA
ADVISORY NR: 2020/25
OBS PSN: 19/0600Z S2136 W17812
CB: WI 180NM OF TC CENTRE TOP FL520
MOV: SSE 08KT
C: 990HPA
MAX WIND: 40KT
FCST PSN +6HR: 19/1200 S2212 W17818
FCST MAX WIND +6HR: 35KT
FCST PSN +12HR: 19/1800 S2248 W17824
FCST MAX WIND +12HR: 30KT
FCST PSN +18HR: 20/0000 S2318 W17830
FCST MAX WIND +18HR: 30KT
FCST PSN +24HR: 20/0600 S2348 W17848
FCST MAX WIND +24HR: 30KT
NXT MSG: 20201219/1300Z

Example of Tropical Cyclone Outlook (5-day)

TROPICAL CYCLONE OUTLOOK FOR AREA : EQUATOR TO 25S BETWEEN 160E AND 120W ISSUED FROM RSMC NADI AT 0400UTC WEDNESDAY 16TH DECEMBER 2020.
EXISTING TROPICAL CYCLONES:
TROPICAL CYCLONE YASA CENTRE 917HPA CATEGORY 5 WAS LOCATED NEAR 14.8 SOUTH 174.5 EAST AT 160300 UTC.
TROPICAL CYCLONE ZAZU CENTRE 980HPA CATEGORY 2 WAS LOCATED NEAR 20.8 SOUTH 174.5 WEST AT 160300 UTC.
THE POTENTIAL FOR FORMATION OF ANOTHER TROPICAL CYCLONE IN THE REGION AS FOLLOWS:
THURSDAY 17/12 : VERY LOW
FRIDAY 18/12 : VERY LOW
SATURDAY 19/12 : VERY LOW
SUNDAY 20/12 : VERY LOW
MONDAY 21/12 : VERY LOW
THE NEXT TC OUTLOOK BULLETIN WILL BE ISSUED AT AROUND 0400UTC ON THURSDAY 17TH DECEMBER 2020.



New Caledonia Meteorological Service, Nouméa

Example of Tropical Cyclone Advisory / Bulletin de prévision cyclonique

TROPICAL CYCLONE ADVISORY
Issued by NEW-CALEDONIA METSERVICE at 2018-12-26 00:10 UTC
Name: OWEN
Data at 2018-12-16 00:00 UTC
Latitude: 18.7 S
Longitude: 147.8 E
Location accuracy: within 0 nm
Movement toward: 141.3 degree
Speed of movement: 6.3 kt
Maximum 10-minutes wind: X kt
Maximum wind gust: X kt
Central pressure: X hPa
Radius of 34-knot winds NE quadrant: X nm
Radius of 34-knot winds SE quadrant: X nm
Radius of 34-knot winds SW quadrant: X nm
Radius of 34-knot winds NW quadrant: X nm
Radius of 48-knot winds NE quadrant: X nm
Radius of 48-knot winds SE quadrant: X nm
Radius of 48-knot winds SW quadrant: X nm
Radius of 48-knot winds NW quadrant: X nm
Radius of 64-knot winds NE quadrant: X nm
Radius of 64-knot winds SE quadrant: X nm
Radius of 64-knot winds SW quadrant: X nm
Radius of 64-knot winds NW quadrant: X nm
Radius of maximum winds: X nm
FORECAST DATA
Date (UTC): Location (degree): Accuracy (nm): Max wind (kt)
16/12/18 00UTC: 15.5 S 154.9 E: 30: 50
16/12/18 06UTC: 15.7 S 154.7 E: 40: 55
16/12/18 12UTC: 15.7 S 154.4 E: 50: 55
16/12/18 18UTC: 15.8 S 154.4 E: 60: 50
17/12/18 00UTC: X X: X: X
17/12/18 06UTC: 16.0 S 153.8 E: 80: 45
17/12/18 12UTC: X X: X: X
17/12/18 18UTC: 15.8 S 153.0 E: 110: 35
18/12/18 00UTC: X X: X: X
18/12/18 06UTC: 15.8 S 152.5 E: 120: 30
18/12/18 12UTC: X X: X: X
18/12/18 18UTC: X X: X: X
Next issue time: the 2018-12-26 at 08:30 UTC

CHAPTER 4: COMMUNICATIONS

4.1 General

The Aeronautical Fixed Telecommunications Network (AFTN) or Aeronautical Message Handling System (AMHS) and the Global Telecommunications System (GTS) are used for the interchange of forecasts, warnings and observations. Fax, the Emergency Managers Weather Information Network (EMWIN) and the Internet (Homepages and E-mail) are other means of disseminating forecasts and warnings and other tropical cyclone information between TCWCs/NMCs and users.

4.2 Contacts in National Meteorological Services

A list containing the postal addresses, AFTN/AMHS addresses, telephone, fax, Internet (E-mail + Homepage) of key officials of National Meteorological Services is given in a separate document to RSMCs, TCWCs and NMHSs to facilitate correspondence, exchange of messages and discussions. Changes to these addresses are relayed to RSMC NADI and TCWCs by 30 September each year or immediately if they occur during a cyclone season.

4.3 RSMC NADI Communication Centre outage

When RSMC NADI is not able to operate through communication equipment failure, storm damage, or any other reason, Members who normally pass weather observations to NADI are requested to pass those observations on to TCWC Wellington by any means available (e.g. telephone +64-4-4700-775 or E-mail data.manager@metservice.com) using the following format (including a valid TTAAii header code) as shown in the example below from Niue:

SUBJECT: PASSAFTN RELAY
TO AFTN
GG METEX
SAPS31 NIUE 302000
METAR NIUE 30200Z 05008KT 50KM SCT018 SCT030 BKN110 26/24 Q1011=

4.4 METAREA Coordinator contact list

Under the IMO/WMO Worldwide Met-Ocean Information and Warning Service (WWMIWS), the provision of products on marine communication systems is coordinated by a METAREA Coordinator. In the event of an inability to disseminate products, RSMCs and TCWCs should advise the relevant METAREA Coordinator for area X (Australia) and XIV (New Zealand).

https://community.wmo.int/WMO-Approved-METAREA-Coordinator-list

CHAPTER 5: CONTINGENCY PLANS

5.1 Introduction

This Chapter specifies the operational procedures to maintain tropical cyclone surveillance and the issuing of warnings whenever one of the Warning Centres unable to meet its responsibility.

The term **full responsibility** in this Chapter means responsibility for the issue of warnings to shipping and aviation.

5.2 Review of plans

Contingency plans are reviewed annually and Members concerned are advised of changes by 30 September.

5.3 Contingency arrangements

The following contingency arrangements are in place:

5.3.1 Failure or partial failure of RSMC NADI

TCWC Wellington temporarily assumes full responsibility for the TCWC functions of RSMC Nadi. These arrangements are referred to in Attachment 5A. The exception is the Special Advisory for the Solomon Islands, for which TCWC Melbourne will assume responsibility.

5.3.2 Failure or partial failure of the TCWC Melbourne

The Australian Bureau of Meteorology has internal back up procedures for the failure of the TCWC Melbourne.

5.3.3 Failure of TCWC Jakarta

TCWC Melbourne assumes full responsibility.

5.3.4 Failure or partial failure of TCWC Port Moresby

TCWC Melbourne assumes full responsibility.

5.3.5 Failure or partial failure of TCWC Wellington

The Meteorological Service of New Zealand has internal back up procedures in the case of failure. However, for the case of an active cyclone crossing into (or inside) the Wellington AOR, RSMC Nadi or TCWC Melbourne (depending on which boundary is crossed) will continue (or resume) issuing tropical cyclone high seas warnings. In the event RSMC Nadi is handling another cyclone, TCWC Melbourne may be requested to issue tropical cyclone high seas warnings for the Wellington AOR with information provided to TCAC Nadi for the aviation Tropical Cyclone Advisory.

5.3.6 Failure or partial failure of Tonga National TCWC

RSMC Nadi assume responsibility for issuing Tropical Cyclone Advisories for Tonga.

5.3.7 Failure or partial failure of Vanuatu National TCWC

RSMC Nadi assume responsibility for issuing Special Weather Bulletins for Vanuatu.

5.3.8 Failure or partial failure of American Samoa

RSMC Honolulu assumes full responsibility.

5.3.9 Failure or partial failure of Samoa Weather Forecasting Office.

RSMC Nadi assume responsibility for issuing Special Weather Bulletins for Samoa.

5.3.10 Failure of partial failure of the Solomon Islands Meteorological Office

TCWC Melbourne assumes responsibility for issuing Special Advisories to the Solomon Islands directly to the Solomon Islands Broadcasting Corporation.

5.4 Responsibility of warning centres with respect to contingency plans

Warning Centres should provide their back-up Centres with all warnings and bulletins templates and address lists covering the area for which back-up may be required, by 30 September each year and immediately advise of subsequent changes.

ATTACHMENT 5A: Fiji/New Zealand Contingency Arrangements

During the cyclone season or for an active TC out-of-season, TCWC Wellington will assume temporary (up to 7 days) responsibility for TCWC functions in RSMC NADI's area of responsibility, as outlined below, whenever RSMC NADI is temporarily unable to carry out this role through;

i) Communication failure, or
ii) Storm damage

For the purpose of this arrangement, these functions are:

- Tropical Cyclone High Seas Warnings
- Special Weather Bulletin for Cook Islands, Fiji, Kiribati, Nauru, Niue, Tokelau and Tuvalu
- Tropical Disturbance Advisories

In addition to RSMC NADI's TCWC responsibilities, TCWC Wellington will also provide temporary backup, under conditions stated above, for;

- High seas forecasts and warnings for MetArea XIV and MetArea X for which RSMC NADI has agreed to act as a "Preparation Service" and as documented in the WMO Manual on Marine Meteorological Services (No. 558).
- Aviation advisory information for tropical cyclones as required by an ICAO designated Tropical Cyclone Advisory Centre as documented in Annex 3 to the Convention on International Civil Aviation (reproduced as WMO-No. 49, Technical Regulations, Volume II, Meteorological Service for International Air Navigation).
- SIGMETs for tropical cyclones in the NADI FIR area

CHAPTER 6: END OF SEASON PROCEDURES

6.1 Introduction

This Chapter describes post-cyclone and post-season activities that should be carried out by Countries impacted by cyclones and Warning Centres, including: public surveys on warning effectiveness and actions, damage assessment reports, best track data and verification of warnings and tracks, and archival and documentation of information.

6.2 Post-cyclone public survey

Assessing the effectiveness of warnings after each cyclone is critical for continuously improving performance of the warning system. These assessments should involve a number of activities seeking feedback from stakeholders which would include members of the public and DRR agencies and would cover:

- Timeliness and clarity warnings;
- Communications difficulties (external and internal);
- Actions taken etc.

An example of a form that might be used is at Attachment 6C. This information should then be made available to the relevant Warning Centre and will form part of the ongoing review of the Operational Plan.

6.3 Damage Assessment Report

Countries affected by tropical cyclones should provide damage assessment reports to the relevant Warning Centre for inclusion in case studies and seasonal summaries, ideally not later than 31 May. The damage report is recommended to include:

- Estimated and observed winds (sustained and maximum gusts) and central pressure
- Rainfall totals (24 hours or less) and intensities
- Storm surges/wave run-up or still water)
- Flooding and landslides
- Damage and casualties.

6.4 Best Track Data and Verification of Warnings and Operational Tracks

Warning Centres will archive information on cyclone tracks and intensities in accordance with the format given in Attachment 6B and make it available to the IBTrACS program at the World Data Center for Meteorology (IBTrACS.Team@noaa.gov) as soon as the finalized track data become available.

Warning Centres will use this data to produce verification statistics to monitor performance from a technical perspective.

6.5 Archival and documentation of information

RSMC Nadi and the TCWCs maintain a tropical cyclone case history on each tropical cyclone in their areas of responsibility. RSMC Nadi will produce a seasonal cyclone summary for its area of responsibility and distribute to Members with a copy to WMO. A copy is also sent to Australia to be incorporated into a Regional Tropical Cyclone Summary for the South Pacific and South-East Indian Ocean.

ATTACHMENT 6A: Post-cyclone public survey form to monitor the performance of the tropical cyclone warning system – suggested format

Thank you for spending a few minutes of your time to fill in this survey.

Your answers will help RSMC NADI to check on the performance of the Tropical Cyclone Warning System and decide whether any changes need to be made.

Question 1. What was the name of the tropical cyclone?

Question 2. Where were you during the cyclone?
Give name of village and island and, if appropriate, name of actual town or city.

Question 3. Were you provided with any information about the tropical cyclone during its passage?

If no, state why?

If yes, by what means:

- Local Meteorological Service [ ]
- Local radio station [ ]
- TV station [ ]
- Social Media [ ]
- Radio New Zealand International (shortwave) [ ]
- Radio France Outremer [ ]
- Other (e.g. friend, neighbour, work-mate, family member) [ ]

Question 4. If you listened to a radio, in what language did you hear the information?

- English [ ]
- French [ ]
- Native tongue [ ]

Question 5. Do you think the information about the tropical cyclone was?

- Very easy to understand [ ]
- Easy to understand [ ]
- Difficult to understand [ ]
- Very difficult to understand [ ]

If you ticked 'difficult to understand' or 'very difficult to understand', please state why it was difficult for you, e.g. message too long, too much detail, language too technical.

Question 6. Did the information about the tropical cyclone (e.g. its position and movement, the strength of the wind, flooding due to rain or sea, very heavy surf) give you all the information you wanted to know [yes/no]?

If 'no', what information was missing?

Question 7. What action did you take in response to the information?

- Waited for later information [ ]
- Decided there was no need for any action [ ]
- Did all I could to reduce the effects of the cyclone [ ]

Question 8. Overall, do you think the warning service given by RSMC NADI or the Tropical Cyclone Warning Centre, was:

- very good [ ]
- good [ ]
- fair [ ]
- poor [ ]
- very poor [ ]

If you answered 'fair', 'poor' or 'very poor' please explain why.

Question 9 (if applicable). In general, bulletins issued by warning centres DO NOT contain Preparedness Action Statements (e.g. take precautions, make preparations, seek shelter). Instead, such statements are made in separate radio messages.

Please tick your preference:

- I am happy with this arrangement [ ]
- I would like to see preparedness action statements included in tropical cyclone bulletins [ ]

Question 10. Answer these questions about the WIND if you can.

What time did the strongest winds occur?

What direction (e.g. off the sea, off the land, northwest, southeast, etc.) did the strongest winds come from?

How strong (gale, storm or hurricane) do you think the wind became? Did the winds suddenly become light during the cyclone before becoming strong again from another direction? [yes/no]

If 'yes', about what time did the winds become light and how long did they stay light?

Question 11. During the fury of the tropical cyclone, did you experience a very high tide like you have never experienced before? [yes/no]

If 'yes', please say how high the tide was or how far inland the sea came

Question 12. Do you think the effect of this cyclone on your island was: (tick one only)?

- LESS than you expected from the information received [ ]
- MORE than you expected from the information received [ ]
- ABOUT WHAT you expected from the information received [ ]

ATTACHMENT 6B: Global tropical cyclone track and intensity data set – report format

Position	Content
1- 9	Cyclone identification code composed by 2-digit numbers in order within the cyclone season, area code and year code. E.g., 01SWI2000 shows the 1st system observed in South-West Indian Ocean basin during the 2000/2001 season. Area codes are as follows:
	ARB = Arabian Sea
	ATL = Atlantic Ocean
	AUI = Australian Indian Ocean Region
	AUP = Australian Pacific Ocean Region
	BOB = Bay of Bengal
	CNP = Central North Pacific Ocean
	ENP = Eastern North Pacific Ocean
	ZEA = New Zealand Region
	SWI = South-West Indian Ocean
	SWP = South-West Pacific Ocean
	WNP = Western North Pacific Ocean and South China Sea
10-19	Storm Name
20-23	Year
24-25	Month (01-12)
26-27	Day (01-31)
28-29	Hour - universal time (at least every 6 hourly position - 00Z, 06Z, 12Z and 18Z)
30	Latitude indicator:
	1=North latitude;
	2=South latitude
31-33	Latitude (degrees and tenths)
34-35	Check sum (sum of all digits in the latitude)
36	Longitude indicator:
	1=West longitude;
	2=East longitude
37-40	Longitude (degrees and tenths)
41-42	Check sum (sum of all digits in the longitude)
43	position confidence*
	1 = good (<30nm; <55km)
	2 = fair (30-60nm; 55-110 km)
	3 = poor (>60nm; >110km)
	9 = unknown
Note*	Confidence in the centre position: Degree of confidence in the centre position of a tropical cyclone expressed as the radius of the smallest circle within which the centre may be located by the analysis.
44-45	Dvorak T-number (99 for no report)
46-47	Dvorak CI-number (99 for no report)
48-50	Maximum average wind speed (whole values) (999 for no report).
51	Units 1=kt, 2=m/s, 3=km per hour.
52-53	Time interval for averaging wind speed (minutes for measured or derived wind speed, 99 if unknown or estimated).
54-56	Maximum Wind Gust (999 for no report)
57	Gust Period (seconds, 9 for unknown)
58	Quality code for wind reports:
	1=Aircraft or Dropsonde observation
	2=Over water observation (e.g. buoy)
	3=Over land observation
	4=Dvorak estimate
	5=Other
59-62	Central pressure (nearest hectopascal) (9999 if unknown or unavailable)
63	Quality code for pressure report (same code as for winds)
64	Units of length: 1=nm, 2=km
65-67	Radius of maximum winds (999 for no report)

Position	Content
68	Quality code for RMW:
	1=Aircraft observation
	2=Radar with well-defined eye
	3=Satellite with well-defined eye
	4=Radar or satellite, poorly-defined eye
	5=Other estimate
69-71	Threshold value for wind speed (gale force preferred, 999 for no report)
72-75	Radius in Sector 1: 315o-45o
76-79	Radius in Sector 2: 45o-135o
80-83	Radius in Sector 3: 135o-225o
84-87	Radius in Sector 4: 225o-315o
88	Quality code for wind threshold
	1=Aircraft observations
	2=Surface observations
	3=Estimate from outer closed isobar
	4=Other estimate
89-91	Second threshold value for wind speed (999 for no report)
92-95	Radius in Sector 1: 315o-45o
96-99	Radius in Sector 2: 45o-135o
100-103	Radius in Sector 3: 135o-225o
104-107	Radius in Sector 4: 225o-315o
108	Quality code for wind threshold (code as for row 88)
109-110	Cyclone type:
	01= tropics; disturbance (no closed isobars)
	02= <34 knot winds, <17m/s winds and at least one closed isobar
	03= 34-63 knots, 17-32m/s
	04= >63 knots, >32m/s
	05= extratropical
	06= dissipating
	07= subtropical cyclone (non frontal, low pressure system that comprises initially baroclinic circulation developing over subtropical water)
	08= overland
	09= unknown
111-112	Source code (2 - digit code to represent the country or organization that provided the data to NCDC USA. WMO Secretariat is authorized to assign number to additional participating centres, organizations)
	01 RSMC Miami-Hurricane Center
	02 RSMC Tokyo-Typhoon Center
	03 RSMC-tropical cyclones New Delhi
	04 RSMC La Reunion-Tropical Cyclone Centre
	05 Australian Bureau of Meteorology
	06 Meteorological Service of New Zealand Ltd.
	07 RSMC NADI-Tropical Cyclone Centre
	08** Joint Typhoon Warning Center, Honolulu
	09** Madagascar Meteorological Service
	10** Mauritius Meteorological Service
	11** Meteorological Service, New Caledonia
	12 Central Pacific Hurricane Center, Honolulu
Note**	no longer used

Headings	
1-19	Cyclone identification code and name
20-29	Date time group
30-43	Best track positions
44-110	Intensity, Size and Type
111-112	Source code.